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DEPARTMENT OF ENERGY'S URANIUM ENRICHMENT PROGRAM

HEARING

BEFORE THE

SUBCOMMITTEE ON
ENERGY RESEARCH AND DEVELOPMENT

OF THE

COMMITTEE ON
ENERGY AND NATURAL RESOURCES
UNITED STATES SENATE

ONE HUNDRED FIRST CONGRESS

SECOND SESSION

ON THE

DEPARTMENT OF ENERGY'S URANIUM ENRICHMENT PROGRAM

MAY 1, 1990

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DEPARTMENT OF ENERGY'S URANIUM ENRICHMENT PROGRAM

TUESDAY, MAY 1, 1990

U.S. SENATE,
SUBCOMMITTEE ON ENERGY RESEARCH AND DEVELOPMENT,
COMMITTEE ON ENERGY AND NATURAL RESOURCES,
Washington, DC.

The subcommittee met, pursuant to notice, at 9:30 a.m., in room SD–366, Hon. Wendell H. Ford, presiding.

OPENING STATEMENT OF WENDELL H. FORD, U.S. SENATOR FROM KENTUCKY

Senator FORD. Good morning, ladies and gentlemen. I am pleased to be here today to chair the oversight hearing on the Department of Energy's uranium enrichment enterprise.

The world uranium enrichment market is changing rapidly, more and more utilities are shunning traditional long-term contracts and looking to the spot market for enriched services. The role of brokers is increasing. The stigma of purchasing enriched uranium from Eastern Europe is vanishing, and an avalanche of Soviet enriched uranium is just waiting to fall on this country.

Competition for business at the end of this decade is heightening, but DOE continues to price its services far too high. The bottom line is that it does not have to be that way. For years now I have followed the decline of the DOE uranium enrichment enterprise. I have watched in dismay as more than $1 billion of commitments have been lost.

For years now I have asked the Congress to focus on DOE's ills. While the Senate has consistently supported a healthy enrichment program the House has yet to take any action, and I urge them to do so, for time, in my opinion, is running out.

Although the enrichment enterprise is ailing, it is not lost forever—yet. With some help from Congress, the enterprise can become more businesslike. The enterprise can recapture some of its lost business.

A healthy U.S. enrichment industry will provide utilities with a secure and sensibly-priced source of enrichment services. At the same time, it will provide the highest return possible to taxpayers for their significant investment in the enterprise.

The consequences of inaction are great. We will increase our dependence on foreign energy sources. We will increase the cost of our national defense. We will leave the Government bearing the

full brunt of huge environmental liabilities. The consequences of inaction are far too great to be ignored.

Restructuring is a long-term solution. In the near term, however, DOE is facing many difficult challenges. These challenges may point DOE in a very different direction. For example, for the first time the Soviets are being viewed as a reliable and low-cost supplier by customers world-wide. Soviet prices are less than half of other suppliers, including DOE. There is significant pressure on DOE to keep costs down. In addition, the question of unfair trade practices is raised.

While there is significant pressure on DOE to keep costs down, there are other equally strong upward pressures on DOE's cost. The development of the AVLIS, compliance with environmental laws and planning for the eventual D&D of the enrichment facilities are all putting pressure on DOE to raise more cash. Unfortunately, this upward pressure comes as our customer base declines.

The need for more cash with fewer customers does not bode well for DOE's price competitiveness. Once the death spiral starts, it will even be more difficult to save this business. This senator, and the Senate as a whole, have made a commitment to putting this ailing business back on its feet. Restructuring the enterprise as a Government corporation is necessary not just for the success in the long-term, but for survival.

The issues we will discuss today are equally critical for the survival of the enterprise, and I look forward to the testimony of our distinguished witnesses.

There is some protocol here, they say, that this witness representing such and such go first, and this one second. I am not so much interested in protocol as I am action, so I have kind of divided the panel up into twos this morning, and the first two witnesses will be Hon. William H. Young, who is Assistant Secretary, Office of Nuclear Energy, and Robert Reinstein, Director of Energy and Natural Resources, Office of the U.S. Trade Representative.

Good morning, gentlemen, and we are delighted to have you here with us and we will have Mr. Young's testimony first. Mr. Young?

[The prepared statements of Senator Johnston and Senator McClure follow:]

STATEMENT OF SENATOR J. BENNETT JOHNSTON
May 1, 1990

Subcommittee on Energy Research and Development
Hearing on the Uranium Enrichment

I congratulate Senator Ford for holding this hearing on the Department of Energy's uranium enrichment program. One of the most serious, immediate problems in the jurisdiction of this Committee is the state of the DOE enrichment program.

This is really a $1.4 billion business operated by DOE. Unfortunately it is a business headed for collapse.

DOE used to have revenues of over $2 billion annually. DOE used to have the world market.

Today, DOE is selling uranium enrichment for twice the spot market price. DOE has a little less than half the world market.

The enrichment capacity in the world substantially exceeds the demand for enrichment services. There are large excess inventories being offered for sale. It is a buyers market. DOE has made itself a high cost supplier.

Major new, low cost suppliers are poised to challenge DOE for market share. The biggest such supplier is the Soviet Union.

DOE's program management is nearly totally tied up with the red tape of the federal bureaucracy. It is difficult for the cleverest and most resourceful suppliers to survive in such a buyers market. It would be impossible for DOE to survive as it is currently organized, but for the one factor in DOE's favor.

That factor is the existence of long term contracts between DOE and U.S. utilities. These are tightly written contracts, hard for the utilities to break. If the

utilities could break them, they surely would.

These contracts will not last forever. By 1995, the requirement to buy from DOE begins to decline. By 2000 it is gone completely. So DOE's days in this business are numbered. The utilities will leave DOE when they can and buy spot market material.

This sounds like a hopeless situation.

It is a situation that is self-inflicted, but it is not hopeless. We know the solution. DOE must restructure its operations to act like a business. It must make use of its great assets -- the gaseous diffusion plants (GDPs) today and the atomic vapor laser isotope separation (AVLIS) technology for the future.

Senators Ford, McClure, and Domenici have been leaders in this matter. Together, we passed the legislation to accomplish the restructuring of DOE's program. We passed it three times. The bill awaits action in the House.

What I cannot understand is why the Department has not done more to move that legislation forward. The federal government has enormous exposure in this matter: exposure in lost business overseas, in environmental and decommissioning costs at the GDPs, in costs of AVLIS development and deployment, in maintaining a supply of enriched uranium for defense.

If I were in DOE, I would not want to be responsible for this collapse. Well, now is the time to act to avoid the collapse, not in 1995 when the cash flow losses begin.

We have passed the legislation. DOE needs to do more to see that it is enacted.

OPENING STATEMENT
SENATOR JAMES A. McCLURE
COMMITTEE ON ENERGY AND NATURAL RESOURCES
May 1, 1990

URANIUM ENRICHMENT

Good morning, ladies and gentlemen. The availability of competitively priced domestic uranium supplies for nuclear electric power generation is critical to the provision of reliable electric supplies to all American consumers. However, no one questions that our current Federal uranium enrichment enterprise continues to be severely constrained in its ability to respond to today's market challenges.

I recognize that this is a complex issue. Nevertheless, the failure of the Congress to deal with this problem threatens the long-term economic viability of the enterprise itself. Early resolution of this situation is imperative.

Last July, 10-months ago, for the third time the Senate passed legislation, with Administration support, which would resolve this problem by creating a Federal enrichment corporation. Similar legislation passed the Senate in the 99th and a year ago in the 100th Congress -- this is the 101st Congress.

By now we should have been holding hearings with witnesses from the Federal Enrichment Corporation. I recognize that the specific recommendations of the DOE contracted Smith Barney Study are not yet

available, but I understand that the general conclusion simply confirms what we all knew two years ago and the General Accounting Office told the House last July -- the Federal enrichment enterprise needs restructuring as a commercial enterprise. To permit so much time to pass without resolving this matter is not in the national interest. Surely we now can complete action this year on this vital legislation.

For more than 20 years the United States had a worldwide monopoly on uranium enrichment services. The Federal government has provided these enrichment services on a timely, reliable and competitive basis. But the Department of Energy is rapidly losing customers to competition from abroad.

We can talk all we want to about free trade, but some of this competition is subsidized. Once again Russia has activated its excess enrichment capacity in its quest for hard currency. This recurring situation should be directly addressed and resolved by U.S. negotiators during the current deliberations with the Soviet Union. Their failure to do so has significant adverse implications for our national security.

From these perspectives, I look forward to today's testimony.

STATEMENT OF WILLIAM H. YOUNG, ASSISTANT SECRETARY, NUCLEAR ENERGY, DEPARTMENT OF ENERGY

Mr. YOUNG. Thank you, Senator. I am pleased to have this opportunity to discuss the Department of Energy's uranium enrichment activities. The Department's uranium enrichment enterprise is a vital part of the nuclear industry. Our efforts to revitalize the nuclear option include placing the uranium enrichment enterprise on a more competitive footing. The Department operates two facilities in enriched uranium for commercial nuclear reactor fuel and for naval reactors. Approximately 90 percent of the $1.5 billion in annual revenues comes from the commercial sector.

Today we have approximately 50 percent of the commercial world enrichment market. Although this makes us the largest single supplier, we face increasing competition and must constantly innovate to retain our market share.

To compete more effectively against foreign providers of enrichment services, we believe that it is necessary to restructure the uranium enrichment enterprise in the United States and have proposed legislation to create a Government-owned enrichment corporation. In the meantime, we are taking steps to improve the efficiency of the enterprise and concentrate on environmental responsibilities.

During fiscal year 1991, our efforts will focus on these two important areas, environmental responsibility and competitiveness in the world enrichment market.

In uranium enrichment, safe and environmentally acceptable plant operations in full compliance with all laws and regulations are priority considerations. In June of last year Secretary Watkins announced a ten-point initiative to strengthen safety, environmental protection and waste management activities at DOE production, research and test facilities.

In order to improve the quality and uniformity of enrichment operations, a comprehensive standard for conduct of operations like that used for commercial nuclear power plants has been issued and is being applied at both enrichment facilities.

The key element of the President's fiscal year 1991 budget as well as legislation submitted by the Administration to Congress to create a Government corporation for uranium enrichment is the creation of a Decontamination and Decommissioning fund in Treasury. It is planned that about $50 million each year of uranium enrichment revenues will be transferred to this fund. We believe that moneys for D&D should be set aside starting in 1991 if there is to be a sufficient amount available when enrichment facilities reach the end of their expected useful lives.

The President's fiscal year 1991 budget proposes appropriation language that would establish a D&D fund in Treasury. If legislation is passed creating a Government corporation, this fund would become available to the corporation for D&D activities.

In fiscal year 1991 the enrichment enterprise plans to spend more than $90 million to upgrade and bring active sites into compliance with environmental requirements. This is equivalent to approximately 30 percent of the enterprise's non-power operating budget.

During the last year, one of the Department's Tiger Teams visited our production plant at Portsmouth, Ohio. Since then, our operating contractor, Martin Marietta Energy Systems, and the DOE office at Portsmouth have made considerable progress in developing and implementing action plans to respond to the specific findings.

Additionally, we have formulated an action plan to address deficiencies in some key management areas including the tendency to focus on individual findings rather than root causes, plans for strengthening the plant's technical self sufficiency while lessening its isolation from Martin Marietta and DOE, a change in corporate culture, and the delineation of clear lines of responsibility, authority and accountability.

For the long term, the enterprise is establishing permanent management systems to maintain high levels of performance and institutionalize the processes associated with continuous striving for excellence.

Evolving market forces have intensified the need for the enrichment enterprise to improve its ability to compete in the world market. In addition, the enterprise must ensure that a meaningful response to changing customer attitudes is implemented in order to sustain and hopefully increase market share.

The most significant new market factor involves the perception that significant quantities of enriched uranium are available at prices much less than those of DOE and other primary enrichment suppliers. This perception has been fueled by the announced intent of the Soviet Union to increase its exported enrichment services. The Soviets' declared objective has been to sell 3 million to 5 million separative work units annually from excess production capacity to generate hard currency as part of their effort to revitalize their economy. Much of the activity to date involving Soviet enrichment has been associated with spot market sales.

Customer interests in examining alternative enrichment supply sources is exemplified by the recent actions of two of DOE's largest customers. In February of this year, the Tennessee Valley Authority requested bids from all major suppliers and brokers/traders for its enrichment needs beyond 1995 that are not currently under contract. Commonwealth Edison, our largest domestic customer, also solicited bids for its post-1995 enrichment needs.

In addition to considering alternative enrichment suppliers for their uncommitted needs, a number of domestic utilities are also evaluating the economic feasibility of terminating existing contractual commitments for DOE in order to replace those commitments with offers from other suppliers. In the buyer's market that exists today, this kind of bid seeking is to be expected. To the best of our knowledge, however, it has not resulted in any new or changed long term commitments.

In addition to the emerging competition from the Soviet Union, progressive actions continue to be taken by other existing and potential enrichment suppliers.

It is noteworthy that the combined production capacity of the four major suppliers of commercial uranium enrichment significantly exceeds world demand. The growth of nuclear power over

the next ten years is not expected to be sufficient to change this supply/demand imbalance.

Nevertheless, for a variety of reasons, efforts are under way to increase production capacity, and competition is increasing. Japan has announced plans to expand its indigenous commercial capacity beyond its current minimal production level perhaps to as high as 1.5 million SWUs by the end of the 1990s.

One of the European consortia, URENCO, has announced plans along with U.S. partners to construct and operate a 1.5 million SWU plant in Louisiana by the mid 1990s with the capability of doubling that capacity if conditions warrant. All of these actions and announced plans are intensifying the competitive nature of the world enrichment market.

In response to these market developments, DOE efforts to improve its ability to compete in the world market will focus on several key areas. These include providing the best value possible to existing customers, implementing significant cost reduction activities, aggressively pursuing the advantages associated with the Atomic Vapor Laser Isotope Separation technology, and creating a Government-owned corporation for uranium enrichment as the best means to institutionally preserve the competitive enrichment enterprise in the United States.

One of the first steps we are taking is to provide the best value to our customers in terms of price and quality of service. We intend to maintain our untarnished record of on-time deliveries within specifications. The basic objective is to assure our customers that we will treat their problems as our own and that any unique circumstances will be addressed as responsibly and efficiently as possible.

The most significant near term action involves cost control at our existing enrichment plants. In particular, DOE has implemented a power procurement strategy for the 1990s that will lock in low cost firm power while maximizing the use of off-peak, non-firm power in order to reduce production costs. In fact, about 20 to 25 percent of the total power purchased in the next few years will be supplied on an off peak nonfirm basis. About $100 million in savings are projected to be realized by this power purchasing method.

In the long run, our best hope for major cost reductions is the successful deployment of the AVLIS technology. Accordingly, the AVLIS budget request shows the greatest proportional increase, 19 percent above fiscal year 1990, of any single expense category.

Along with the $154.5 million fiscal year 1991 budget request, the Department submitted to Congress an AVLIS Demonstration and Deployment Plan committing to a full-scale technology demonstration in 1992 along with the activities necessary to support the eventual establishment of a production facility. A determination whether to proceed with deployment of the AVLIS technology will be made in November 1992.

To ensure an informed decision as to whether to make a transition to AVLIS production, the uranium enrichment enterprise plans to establish an industrial access program in 1990 to build a strong industrial infrastructure that can evaluate and potentially support the transition of the technology to commercial use. This will be followed by the competitive selection of a commercial de-

ployment contractor in 1991 to ensure that sufficient and necessary industrial resources are ready to successfully build and operate a production plant if AVLIS is shown to be economically justified.

Finally, we will obtain independent assessments from an industrial review group to provide technical and business evaluations of AVLIS development and to guide us in arriving at a deployment decision.

DOE believes that the best prescription for the uranium enrichment enterprise's competitiveness is the creation of a Government-owned corporation as a transition to a private corporation as proposed in legislation submitted by the Administration. Such a corporation would be more flexible than a Government agency with respect to budgeting, marketing, contracting and management and administration.

To provide an independent analysis of the financial prospects of restructuring the Department's uranium enrichment enterprise, DOE has retained the investment banking firm of Smith Barney. We believe this independent assessment will provide both the Congress and DOE with important information concerning the profitability and commercial potential of a number of restructuring alternatives.

DOE strongly supports the passage of legislation to create a Government enrichment corporation. We appreciate the leadership that has been shown by this Committee and by you, Senator Ford, leading to the passage of S. 83 in the Senate. We are actively encouraging the committees of the House to report out a bill that we can support. We stand ready to work in close cooperation with the Congress to refine the proposals that are currently under consideration.

I thank you for this opportunity to address you and will be glad to answer your questions.

Senator FORD. Mr. Reinstein, if you would like to make your statement, then we may ask questions.

STATEMENT OF ROBERT A. REINSTEIN, DIRECTOR, ENERGY AND NATURAL RESOURCES, OFFICE OF THE U.S. TRADE REPRESENTATIVE

Mr. REINSTEIN. Thank you, Mr. Chairman, I will try to be relatively brief.

The Office of the U.S. Trade Representative appreciates the opportunity to appear before the committee today to present our views on uranium, within the context of U.S./Soviet trade.

With respect to our overall trading relationship with Eastern Europe and the Soviet Union, the Administration is attempting to foster the operation of market forces in these economies through solid trade and investment agreements, along with assistance, which is particularly aimed at the private sectors now beginning to develop in those countries.

This, we believe, is a proven recipe for creating prosperity and for increasing economic opportunities for the United States in these developing and potentially lucrative markets. Our trade and investment policy towards Eastern Europe complements our financial aid and technical assistance packages.

The trade and investment aspects of our policy are being coordinated by the inter-agency trade policy review group, which is chaired by the Office of the USTR within the context of our broader foreign policy objectives. Good bilateral agreements with the United States can help stimulate entrepreneurship of these economies and build foreign investors' confidence, and thereby promote trade development.

The governments in these countries will continue over the near term to play an important role in their economies, but our agreements ought to ensure that American firms can operate with maximum flexibility in their day-to-day operations, and be confident of receiving fair treatment in all aspects of their commercial activities.

Now the trade agreement we are seeking with the Soviets presently has a number of specific objectives, including effective protection for intellectual property rights, removal of barriers to trade, and business facilitation elements, such as freedom to establish commercial representation offices and access to internal distribution networks.

The trade agreement we are pursuing will also ensure effective procedures for addressing market disruption resulting from import surges from economies of this type. The market disruption provision reflects the provisions in sections 405 and 406 of the Trade Act of 1974. And it is one of the areas that the private sector focused on in submitting comments to USTR as part of the Federal Register public comment process.

Most of the people commenting supported extending Most Favored Nation Treatment to the Soviet Union, but quite a few also wanted to make sure that our own trade laws, which are designed to combat unfair trade, were not impinged upon in the process. And I can assure you that our trade laws are reinforced and not weakened by the agreement we are considering.

Trade agreements of the type that we are negotiating with the Soviet Union presently have an initial duration of three years, with the option to continue them for additional periods of three years at a time. With most trade agreements with these countries, we will also seek bilateral investment treaties.

And our objective in the bilateral investment treaties are to, first, have the right to establish an investment in these countries; secondly, to be treated on a basis no less favorable than the better of Most Favored Nation Treatment or national treatment; third, binding dispute settlement procedures, including referral to third party arbitration at the investor's decision; fourth, international law standards for expropriation and compensation; and fifth, unrestricted transfers of funds associated with investments.

In the case of centrally planned economies in transition, we would also require opportunities for competition for U.S. investors equivalent to state-owned enterprises.

It should also be noted that the United States has separate sector-specific agreements with the Soviet Union either in place or under negotiation, including agreements on grain sales, maritime and civil air transportation. The subcommittee has expressed a specific interest in uranium in this hearing, and let me make a few comments on uranium.

The world uranium market has been depressed for a good decade now, and prices of natural uranium, which were hovering around $16 a pound in the mid-1980s, are recently down to $10 a pound or less. Most sectors of the industry have struggled with overcapacity during this entire period. In the mining and milling sector, some of the overcapacity has been reduced by the closing of mines and mills. We still have some left.

This has contributed to price weakness all the way through the nuclear fuel cycle. In the enrichment sector, the capacity was also built up considerably during the 1970s boom period. And this has put some pressure, which we have heard about, on the world market for enrichment services.

With respect to the U.S. uranium import picture, the overwhelming majority of our imports come from Canada and have traditionally come from Canada. The Soviet Union has been, at most, a minor supplier, and I understand there are various forecasts of what their role may be in the future. But the history so far is that they have not been much of a factor in the U.S. market.

And we get most of our information on the trade picture from the DOE data provided by the Energy Information Administration and the Office of Nuclear Energy.

With respect to Administration policy toward trade in uranium we have generally approached it as we have approached trade in all other energy commodities. That is, we are seeking to create a climate through government policies in which the trade will be free and fair, based to the maximum extent possible on market forces.

We have sought to rely on our domestic trade laws to assure that unfair trade does not cause injury to our industries. As already noted, those laws are available today and will remain available to U.S. industries to respond to any allegations of unfair imports from the Soviet Union.

In conclusion, we feel confident that the trade and investment agreements we are considering, if successfully concluded, will be important factors in stimulating trade and investment between the United States and these important newly emerging market economies in Eastern Europe.

I must emphasize, however, that the key to successful economic reform and integration into the world economy will be the nature and speed of internal market economic reform undertaken by the individual countries, and most of all, the degree to which private enterprise, domestic and foreign, will be allowed freedom to invest and to expand free of bureaucratic hindrances.

U.S. traders and investors are eagerly awaited in Eastern Europe, as in other countries, and the right conditions will need to be established to attract them and to receive the benefits of their capital, technology and managerial expertise.

Thank you, Mr. Chairman, I will be available to answer any questions.

[The prepared statement of Mr. Reinstein follows:]

STATEMENT OF

ROBERT A. REINSTEIN

DIRECTOR FOR ENERGY AND NATURAL RESOURCES

OFFICE OF THE U.S. TRADE REPRESENTATIVE

BEFORE THE

SUBCOMMITTEE ON ENERGY RESEARCH AND DEVELOPMENT

COMMITTEE ON ENERGY AND NATURAL RESOURCES

UNITED STATES SENATE

MAY 1, 1990

Mr. Chairman and members of the Subcommittee, the Office of the U.S. Trade Representative appreciates the opportunity to appear before you today and present our views on uranium within the context of U.S.-U.S.S.R. trade.

With respect to our trading relationship with Eastern Europe and the Soviet Union overall, the Bush Administration is attempting to foster the operation of market forces in these reforming economies through solid trade and investment agreements, along with assistance aimed at the nascent private sectors. This is the proven recipe for creating prosperity and for increasing economic opportunities for the United States in these developing and potentially lucrative markets.

TRADE AND INVESTMENT AGREEMENTS

Our trade and investment policy toward Eastern Europe complements our financial aid and technical assistance packages. The trade and investment aspects of our policy are being coordinated by the interagency Trade Policy Review Group (TPRG), chaired by USTR, within the context of our broader foreign policy objectives.

Good bilateral agreements with the United States can help stimulate entrepreneurship in these economies and build foreign

investors' confidence, and thereby promote trade and development. The governments in the USSR and each Eastern European country will continue over the near term to play an important role in their economies, but our agreements ought to ensure that American firms can operate with maximum flexibility in their day-to-day operations and be confident of receiving fair treatment in all aspects of their commercial activities.

The trade agreement we are seeking with the Soviets has a number of specific objectives, including effective protection for intellectual property; removal of barriers to trade; business facilitation elements such as freedom to establish commercial representation offices, and access to internal distribution networks.

The trade agreement will also ensure effective procedures for addressing market disruption resulting from import surges from a command economy. The market disruption provision reflects the provisions in Sections 405 and 406 of the Trade Act of 1974, and was one of the areas the private sector focused on in submitting comments to USTR as part of the Federal Register process. Most every commentator supported extending MFN to the Soviet Union, but quite a few also wanted to make sure our own trade laws designed to combat unfair trade were not impinged in the process. I can assure you that our trade laws are reinforced, not weakened, by this agreement.

Trade agreements of the type being negotiated with the Soviet Union have an initial duration of three years, with the option to continue them for additional periods of three years at a time.

With most Title IV trade agreement countries we also will seek bilateral investment treaties. Our objectives in these treaties are: the right to establish an investment and thereafter to be treated on a basis no less favorable than the better of MFN or national treatment; binding dispute settlement procedures including referral to third party arbitration at the investor's decision; international law standards for expropriation and compensation; and unrestricted transfers of funds associated with investments. In the case of centrally planned economies in transition, we also would require opportunities for competition for U.S. investors equivalent to state-owned enterprises.

It should also be noted that the U.S. has separate sector-specific agreements with the Soviet Union, either in place or under negotiation, for instance to cover grain sales, maritime and civil air transportation.

TRADE IN URANIUM

In addition to these general observations on our trade relations with the Soviet Union, the Subcommittee has indicated an interest

in uranium trade in particular. The world uranium market has been depressed for nearly a decade now, and prices of natural uranium in the past couple of years have dipped even lower, to $10 a pound or less. Overcapacity in the mining and milling sector has been reduced somewhat by widespread closing of mines and mills, but some overcapacity still persists, contributing to continuing price weakness. There has also been overcapacity in the enrichment sector, also built up extensively during the "boom" period in the 1970's, and this has put pressure on world prices for enriched uranium and for uranium enrichment services. With respect to the uranium import picture, the overwhelming majority of our imports, which account for about half our current consumption by electric utilities, has been and continues to be from Canada. The Soviet Union has been at most a minor supplier of uranium to the U.S. market. The Department of Energy has detailed much of this in their annual uranium studies.

With respect to the Administration policy toward trade in uranium, we have approached it as we have trade in other energy commodities, that is, seeking to create a climate through government policies in which trade will be free and fair, based to the maximum extent possible on market forces. We have sought to rely on our trade laws to assure that unfair trade does not cause injury to our industries. As already noted, those laws are available today and will remain available to respond to any allegations of unfair imports from the Soviet Union.

CONCLUSION

We feel confident that these trade and investment agreements, if successfully concluded, will be important factors in stimulating trade and investment between the United States and these important, newly emerging market economies. I must emphasize, however, that the key to successful economic reform and integration into the world economy will be the nature and speed of internal economic reform undertaken by the individual countries, and, most of all, the degree to which private enterprise -- domestic and foreign -- will be allowed freedom to invest and to expand free of bureaucratic hindrances. U.S. traders and investors are eagerly awaited in Eastern Europe, as in other countries. The right conditions will need to be established to attract them and to receive the benefits of their capital, technology, and managerial expertise.

Senator FORD. Thank you, Mr. Reinstein. I ask unanimous consent that a statement by the Chairman of the full committee, Senator Johnston, be included in the record prior to the testimony by the two witnesses.

I am very pleased to be joined by Senator Domenici, a strong and influential member of this committee, with an interest in this arena.

Do you have an opening statement, Senator?

Senator DOMENICI. No, thank you, Mr. Chairman. I have a limited amount of time and would like to use it for questions. And I thank you.

Senator FORD. Since you are needed for the floor and I am going to be around here for a while, I will be glad to yield to you for questions. And then I will continue my questioning after you have finished.

Senator DOMENICI. I thank you very much.

Senator FORD. We do have two other witnesses, if you could come back, it would be a good idea.

Senator DOMENICI. I will certainly try.

Let me ask this. I understand that DOE is here and you are here on the trade side. Just as a general question, I am trying to read between the lines here with reference to the Soviet Union, and I have not heard even this much detail about what is planned, and I appreciate knowing this much. But I wonder just first, before I talk about uranium enrichment in the Soviet Union and American uranium enrichment, why is there such an elaborate approach to a trade agreement with the Soviet Union, with these rather extensive principles that you have announced, which I do not necessarily find fault with at this point, why have not we done this with Eastern European countries? Why is our first jump in this with the Soviets?

Mr. REINSTEIN. Senator, I am not the Soviet and Eastern European person at USTR, I am the energy and natural resources person, so it is not a process I am involved in, and I understand we are in discussions with a number of countries. It is not exclusively the Soviet Union, but I would really prefer to have our experts who are not here with me today give you a detailed answer.

Senator FORD. Your congressional person told us that there would be a European person accompanying you today that might help you. Do you have an individual with you today?

Mr. REINSTEIN. No.

Senator FORD. I see the head shaking out there. That is a way of not answering questions.

Senator DOMENICI. It is not necessarily critical to my few questions, but it does intrigue me, because many have been saying we need a policy toward a country like Poland, or a country like Czechoslovakia, Hungary, and I have not heard such a litany of proposals for a trade agreement with them discussed. Perhaps they are taking place. I would surely hope that if these principles make sense that they not be available exclusively for the Soviet Union during this transition.

Having said that, let me just tell you that I am very concerned about the uranium enrichment in the United States and its future under the proposals that you have outlined here in your statement

regarding the trade negotiations, and you alluded to it a bit, Mr. Young, but let me tell you why I am concerned.

First of all, the uranium enrichment in the United States is our single holdover from the Government being totally in control of the uranium cycle. We got out of that, but we made a policy decision that we would retain the uranium enrichment part. I think the decision to do that was predicated upon some very sound principles, not the least of which was that we ought to sell to the world, that we were a very good supplier and a good controller of what happened on the other end.

Second, that we would let the private nuclear industry share in the cost, thus permitting us to provide the enriched materials that we needed both for our submarine fleets and for our nuclear weapons in an economic atmosphere where we were not forced to produce that singularly and solely for our defense purposes.

I recall we did a little evaluation of that, Dr. Young. It may no longer be the operative set of facts, but my recollection is that had we relegated exclusively our enrichment to producing for those two purposes, the annual bill for defense would be between $900 million and $1 billion. That was substantially reduced when you put a whole pool of enrichment together involving the civilian nuclear part.

I see you nodding. I do not know that you need to agree with the numbers, but I think that was the philosophy. Do you agree with that?

Mr. YOUNG. Yes, sir.

Senator DOMENICI. Now, if I read between the lines I think we were about to enter into an agreement with the Soviet Union where we are going to buy enriched uranium from them. I do not have any knowledge of that, but let me just ask, is that contemplated? I guess we better ask you both.

Mr. YOUNG. Let me answer the question this way, Senator. We are very concerned about the situation regarding the sales of Soviet enriched uranium in the United States. We are currently evaluating a range of alternatives to allow the uranium enrichment enterprise to compete effectively in a free market environment. We have not reached conclusions, as yet, as to what to recommend.

Senator DOMENICI. Well, I accept that answer, but that is not really telling me anything, when a summit is coming up. It seems to me we are being told rather forthrightly that it is contemplated that as part of that summit there will be an economic agreement. Is that a fair statement? Who knows the answer to that?

Mr. YOUNG. All I know is what I read in the trade press.

Senator DOMENICI. How about you? Could you not answer that question without divulging anything private? Why are you busy telling us what a trade arrangement with the Soviet Union ought to be, if we are not working on one? Is this theory, or something we are really interested in?

Mr. REINSTEIN. The agreement we have been discussing with the Soviet Union is an agreement to allow them to have MFN—Most Favored Nation status. That is, to be treated like most of the rest of the countries in the world. It would not grant them special status, but simply normal status, and it is a type of agreement that

has already been laid out and specified in the past for such economies.

Senator DOMENICI. What is your discussion and your conclusion in your very brief statement about what the arrangement on their side ought to look like in order to assure American investment and trade? That is not simple Most Favored Nation policy. I understand what Most Favored Nation is. It does not require all of these changes by a centralized economy, or does it?

Mr. REINSTEIN. Well, they are seeking American investment. That is, they want us to bring our money and our technology and our market economy expertise to help them reform their economy. We have been discussing with them what kinds of conditions would be necessary and appropriate to have our private sector go and bring those things to help them, so it is that kind of discussion generally.

As I say, I am not involved in it particularly, so again my information is mostly also what I read in the paper. I have not had a chance to sit down and discuss it in detail with our people who are involved.

Senator DOMENICI. You know, this production is not in my State, so do not think I am trying to protect something. I already tried to protect the domestic uranium because we used to produce it all. We lost that fight. We do not have any uranium production left in New Mexico.

I am concerned now just about a very specific issue. It could be that the Executive Branch contemplates an agreement with the Soviet Union that would invite the sale of enriched uranium to the United States by the Soviet Union in ways that would effectively negate the policy that I just described a while ago, because we would not have enough domestic demand to create the pool of demand from which we mix the cost of our defense enrichment with civilian.

I think that is a very, very important issue, not only because of that but because of its other ramifications, and I am just wondering whether the Department of Energy feels that the Government can enter into such an agreement without Congress being partners to it, if the final product is a dramatic reduction in the production of SWUs from our domestic enrichment capability and facilities by domestic companies, leaving us with very little—perhaps only the defense part.

Do you feel in the Department of Energy that that agreement can be entered into without Congress having anything to say about it?

Mr. YOUNG. First of all, the circumstance where what remained for the uranium enrichment enterprise in the United States was basically defense production is an absolutely intolerable situation to the Department of Energy as I am sure it would be to the Congress, and that is not something that we contemplate at all.

Second, as I indicated, we have reached no conclusions as to what alternative to try to pursue to rectify this problem. We are working very diligently and actively on it, and whatever we do would be in concert with the Congress and in accord with the laws that the Congress has passed.

Senator DOMENICI. Well, Mr. Chairman, I just want to say I believe that this is a serious issue. I think it is important for us to know whether there is legal authority to sign an agreement with the Soviet Union with reference to the importation of SWUs or not. I have been around here long enough to know that the Department of Energy can come up here and tell us what they want and what they think and what they like, and then you and I can find out the day after the agreement is signed that they lost out and something else happened.

Senator FORD. I might say to my good friend they will have the authority if their budget rider is passed, and that rider gives them the authority to do that. So we are now being placed in the position of either accepting or declining that proviso as it is set out in their budget request. So we will have an opportunity.

There is a very subtle movement going on in these little attachments. If you do not read the fine print you will find that some day you have given away the store and the store is now owned by somebody else and you have to take the company certificates and go buy from them. I think we need to look at it very closely, and I agree with you very much.

Senator DOMENICI. I am just going to close by saying I do not want this record to indicate that this Senator is against a broader world market including the transition economies of Eastern Europe and the Soviet Union and others in that world market, but I do believe that it is as obvious as the nose on our face that the only principal things the Soviet Union has to sell are those things they produce for defense. Everything would indicate that. They have little else to sell and little other capacity.

I think to invite that kind of trade without analyzing its dramatic impact on a huge investment and a profitable venture like uranium enrichment under the guise of marketplace concepts is absolutely crazy because I do not think that is vested with much of the marketplace concept. They did not build it for a market. They built it for defense. Their entire infrastructure is built on it. It is highly subsidized, and I would be very worried.

That is why I came, so that at least from my standpoint the Department would know that I think Congress ought to be brought in the loop on anything as dramatic as a trade agreement that contemplates significant uranium enrichment SWUs from the Soviet Union; not that I want to be a prohibitor. It is sneaking in now, and we are worried about that. Is that right?

Mr. YOUNG. Yes, sir.

Senator DOMENICI. So I would rather that it not sneak in, that it be right above board. I think we have to know more about it than a nice philosophical trade discussion that ends up with a signature on it and we end up without any uranium enrichment business.

I thank you.

Mr. YOUNG. I assure you we will consult with the Congress before any decision is made.

Senator DOMENICI. I thank you, Mr. Chairman.

Senator FORD. Does Senator McConnell have a statement to make? I yielded to Senator Domenici so that he could go to the floor, and I have not yet asked any questions.

Senator McCONNELL. Thank you, Mr. Chairman. I will not make my opening statement but, rather, insert it in the record. Then after you have done a round of questions, I have some.

Senator FORD. Fine.

Senator McCONNELL. Thank you.

[The prepared statement of Senator McConnell follows:]

SENATOR MITCH MCCONNELL

OPENING STATEMENT

SUBCOMMITTEE ON ENERGY RESEARCH AND DEVELOPMENT

MAY 1, 1990

Mr. Chairman, I commend you for holding this hearing to gather data and hear testimony on the uranium enrichment program. The Department of Energy's enrichment program enters the decade of the nineties facing unprecedented challenges, including heightened international competition, new requirements from the clean air bill, the need to successfully demonstrate and deploy the AVLIS technology and the need to successfully implement the restructuring program designed to create a government corporation to oversee the program's operations. Hopefully, this and subsequent hearings will help clarify what needs to be done to successfully meet these challenges.

Before I begin, Mr. Chairman, let me say that maintaining a viable enrichment capability is important to this nation and I applaud your vigilance in monitoring the program's condition and your leadership in promoting its wellbeing.

Secretary Watkins recently accepted my invitation to tour the Martin Marietta uranium enrichment plant in Paducah, Kentucky. I had the honor of escorting the Secretary on his tour and was impressed with his commitment to the enrichment program.

Indeed, Mr. Chairman, the importance of the federal uranium enrichment program to our national interests is beyond question. A January, 1990 Department of Energy report on the uranium enrichment program states the following:

> "Uranium enrichment is crucial to the nation's security. Much of the national defense depends on enriched uranium, including 40% of the Navy's active combat fleet that is nuclear powered. Uranium enrichment is also an essential part of a full range of fuel cycle services the United States supplies to domestic and foreign utilities enabling our country to preserve its leadership role in the nuclear industry."

The report goes on to note that, in the future, a healthy uranium enrichment industry will contribute to the energy security of our nation by safeguarding domestic utilities from nuclear fuel shortages created by supply interruptions and will contribute to the U.S. balance of payments by increasing the foreign purchase of U.S. enrichment services.

Beyond its importance to the national and energy security of the country, the Department of Energy's uranium enrichment program is also vital to the state of Kentucky. The Martin Marietta plant in Paducah has been an engine of economic growth in Western Kentucky for the last 30 years. The plant directly employs about 1400 Kentuckians and supports thousands of other indirect jobs in the region. The plant also serves to attract highly trained specialists whose contribution to the community is not measurable in simple dollar terms.

Therefore, the success of the program in meeting the challenges of the nineties is of great importance to me. I was particularly concerned to learn recently that the Tennessee Valley Authority is exploring the possibility of purchasing enrichment services from foreign sources, including the Soviet Union.

Let me stress that I support all efforts by TVA to lower its utility rates. As a state, Kentucky is the fourth largest area served by TVA. TVA power plants provide electricity to over 220,000 Kentucky homes and businesses and TVA facilities employ over 2000 Kentuckians with a payroll of $61 million dollars. Lower utility rates at TVA will certainly be good for my state.

What concerns me, Mr. Chairman, is that TVA's shopping around for lower uranium enrichment prices is a clear signal that the domestic program is in trouble. With DoE's price-per-SWU double

that currently charged on the spot market, its no wonder that our uranium enrichment program has lost share of the global enrichment market at a dramatic rate over the last few years.

In my opinion, several things are necessary if our domestic enrichment industry is to regain its competitiveness and remain a viable entity. First, Congress must be aware of the impact clean air legislation will have on the industry and ensure that we do not needlessly put the program at a further competitive disadvantage by jacking up electricity rates. Second, Congress must appropriate adequate funds to ensure that DoE can conduct the research and development needed to keep the program competitive. Third, the Administration must be vigilant in monitoring enrichment activities in the Soviet Union and other countries to ensure that unfair trade practices do not give those competitors an unfair advantage over the U.S. industry. Finally, Congress must act quickly to enact restructuring legislation to put the program on a more competitive footing. This legislation will provide the flexibility necessary for the industry to meet the present and future challenges successfully.

Mr. Chairman, today's hearing is indeed timely and important. I look forward to hearing what our witnesses have to say on each of the critical challenges now facing the enrichment industry.

Senator FORD. Let me follow up a little bit on where Senator Domenici was.

Mr. Young, what volume of sales did DOE lose to the Soviets in 1989? Do you have a judgment on that?

Mr. YOUNG. I cannot tell you specifically by year, Senator, but I think we have lost in our estimate a few percent of our sales volume.

Senator FORD. A few percent?

Mr. YOUNG. Yes, sir.

Senator FORD. What would the cumulative loss to the Soviets since 1986 be? I have a figure. I am not sure it is right. It is around $270 million. Would that be close to being accurate? It is from the numbers that Admiral Watkins gave us when he was confirmed.

Mr. YOUNG. I would have to check that. I am unfamiliar with that particular number, Senator. It probably would be in that range.

Senator FORD. You say would probably be in that range. The figures say there are $170 million I guess from 1986 through 1988 and probably $90 million in 1989. Would you agree that that is reasonably correct?

Mr. YOUNG. As I said, I cannot give you the distribution, but it is in the range of several percent of our market.

Senator FORD. Let us look at it this way. What would be 1 percent of our sales?

Mr. YOUNG. It would be $150 million. I am sorry, $1.5 million.

Senator FORD. 1.5 million. Is that dollars or SWUs?

Mr. YOUNG. Dollars. It is $1.5 billion, so let us say 1 percent is $15 million.

Senator FORD. $15 million. That is why we have trouble with our budget around here.

So you say we have lost several percentage points.

Mr. YOUNG. Yes, sir.

Senator FORD. So that would be roughly $15 million in percentage, and from 1986 through 1989 my figure, then, of $260 or $270 million would be accurate or close to being accurate?

Mr. YOUNG. I think that is probably true. I do not have the exact number.

Senator FORD. What are your expectations of loss in 1990?

Mr. YOUNG. We have not projected a loss. We do have customers that are asking to look at the terms of their contracts.

Senator FORD. TVA has already said that they want to reduce their contract with DOE 30 percent by 1995; is that correct? They want to put you on notice for that?

Mr. YOUNG. That is correct.

Senator FORD. We consider TVA to be another government entity, do we not?

Mr. YOUNG. Yes, sir.

Senator FORD. The Soviets currently export about 3 million SWUs but have indicated publicly they would increase the supply if market conditions are favorable.

How much excess capacity do you believe exists?

Mr. YOUNG. In the Soviet Union?

Senator FORD. Let us just say worldwide or the Soviet Union and then add on to the rest of it.

Mr. YOUNG. A considerable amount. I would guess it is something more than 10 million SWUs per year.

Senator FORD. 10 million SWUs per year in excess?

Mr. YOUNG. Yes, sir. That is a guess on my part.

Senator FORD. What percentage of that would be Russian?

Mr. YOUNG. A large percentage.

Senator FORD. Large I guess would be in the eyes of the beholder. I will say 90 percent. How is that?

At what prices are Soviet SWUs now being sold?

Mr. YOUNG. We understand they are being sold in the price range near $50.

Senator FORD. What do we sell them for?

Mr. YOUNG. Our average price is about $118.

Senator FORD. Why the large discrepancy?

Mr. YOUNG. Ours is for long-term contracts, and theirs is thus far for short-term spot market.

Senator FORD. What if they indicate they can sell more and their spot market is at $50 and they have more to sell? It looks like they could go on for a while at $50. Does it indicate that something other than the free market is at work?

Mr. YOUNG. Senator, we have been evaluating the terms and conditions under which enriched uranium is being sold in the market by the Soviets. Our analysis is not yet fully complete, but we are looking at that very carefully.

Senator FORD. Do you believe that the terms and conditions for sale of Soviet enriched uranium products should be a topic for discussion at the upcoming trade talks between the United States and the U.S.S.R.?

Mr. YOUNG. Probably not, sir. There has been contact with high officials of the Soviet Government on this matter and I do not believe at this time it would be justified at the summit.

Senator FORD. Well, what is the projected total of U.S. demand for SWUs, say in 1995, 1996 to the year 2000?

Mr. YOUNG. I think that between 1996 and the year 2000 there are roughly 26 million SWUs that are currently not committed under a contract.

Senator FORD. Not committed under contract?

Mr. YOUNG. Yes, sir.

Senator FORD. What will be the demand for SWUs, then?

Mr. YOUNG. Well, that is based on demand—expectations.

Senator FORD. Mr. Young, I apologize if I do not quite understand your answer. I have that 26 million SWUs would be surplus?

Mr. YOUNG. No. What we are estimating is there will be a demand for 26 million SWUs in the period from 1996 to 2000 that is currently uncommitted.

Senator FORD. In the United States?

Mr. YOUNG. And in the markets in which DOE sells, which includes Western——

Senator FORD. What is the U.S. number, Mr. Young?

Mr. YOUNG. I am trying to think of the proportion of that. I would say roughly half. I mean, basically when we consider our total market we have about 50 percent of the total western market.

Senator FORD. So 13 million SWUs would be the required amount for the four-year period between 1996 and——

Mr. YOUNG. That would be the amount of additional demand for SWUs that is not currently under contract to someone else.

Senator FORD. How much is under contract, then? That is how you get the total.

Mr. YOUNG. Yes, it is. I would have to check the number. I do not recall it at the moment.

Senator FORD. Is anybody from the enrichment program with you today?

Mr. YOUNG. No, sir.

Senator FORD. Well, I am somewhat concerned that we are not getting the questions asnwered—a large percentage.

Mr. YOUNG. I would be glad to furnish these answers for the record, senator.

Senator FORD. Let me see if I can get to this. DOE has experienced terminations for all or part of customer requirements. Can you give us an up-date on recent terminations for the years 1996 to 2000.

Mr. YOUNG. Yes, sir.

Senator FORD. How many utilities have terminated and how many SWUs does that represent?

Mr. YOUNG. I can tell you the dollar numbers. I do not have the number of utilities. For the years 1996 through 1998 we have lost $160 million per year through terminations.

Senator FORD. That is $320 million?

Mr. YOUNG. $480 million for the three years, and we have lost another $270 million for the year 1999.

Senator FORD. You cannot tell me what percentage of the production that would be?

Mr. YOUNG. Well, it is less than 10 percent.

Senator FORD. Can you tell me how much of the market DOE has captured for that period of time?

Mr. YOUNG. In 1995 we have about 85 percent of the domestic market and roughly half of the total western market. That value declines out through the year 1999. At that time we estimate that we currently have roughly 25 percent of the total world market in 1999 and 45 percent of the world market—I am sorry, the other way around; 25 percent of the world market, 45 percent of domestic.

Senator FORD. Senator McConnell has asked that he be given some time to ask questions, and that is what good chairmen do—yield time, and they have less subjects to ask questions about. So my colleague, go ahead.

Senator MCCONNELL. Thank you, Mr. Chairman. I appreciate your holding this hearing, and you are probing a very important part of the uranium enrichment question. I want to look at just one other here before I turn it back to the Chairman, and that is the impact of the Clean Air Bill on the cost of the uranium enrichment—to the uranium enrichment program.

You mentioned in your testimony that DOE anticipates about $100 million in savings through the 1990s as a result of its power procurement strategy that will lock in low-cost, firm power while maximizing the use of off-peak, non-firm power in order to reduce production costs. I am quoting you.

Have you factored into this analysis the impact of electricity costs of the Clean Air Bill now moving through the Congress?

Mr. YOUNG. We have done an analysis of the impact of the Clean Air Bill. The numbers are not factored into our enrichment prices at the present time.

Senator MCCONNELL. Let me just suggest you need to do that, because an early analysis of the Administration bill by your Department showed that it would increase the cost of the three plants by $245 million. This, in turn, would result in an increased cost of power to DOE of about $15 per SWU.

Mr. YOUNG. We estimate that the Administration bill by the year 2000 will be costing us about $20 a SWU extra. There is a very significant aspect of the bill that has been passed by the House Committee that makes that even more binding. The House Committee has lowered the limits for SO_2 emissions and has targeted specifically the plants that supply the DOE enrichment plants.

Senator MCCONNELL. In fact, it has a dramatic impact, does it not?

Mr. YOUNG. Yes, sir. In price it has an impact, but we estimate another $4 a SWU, which is not significantly above the $20. It makes it $24, but more importantly, the way we interpret that amendment, it makes it effective as of 1995. That is a significant effect that moves the price increase up from the year 2000 to the year 1995 and over the period of those five years would cost the uranium enrichment enterprise more than $600 million additional dollars, which is of very great concern to us.

Senator MCCONNELL. In fact, it is safe to conclude, is it not, under the House Energy and Commerce Committee version, it would be considerably less competitive than we are now, and as Senator Ford has been pointing out, we have got plenty of problems as it is.

Mr. YOUNG. Absolutely true, and we would be less competitive at an earlier date, before we could have the AVLIS plant into the deployment mode.

Senator MCCONNELL. As a matter of fact, how would you handle it? And let us assume that the House Energy and Commerce Committee version became law, practically speaking, where would you be?

Mr. YOUNG. Well, we would have to look at the cheapest ways of buying power, I suspect, if it became law, based on the prices that we are able to gain firm power from these dedicated plants. Even with the additional clean air requirements, it still would be probably most economical to use them. But we would also seek other sources of non-firm power, other ways of running the enterprise to buy the cheapest power available.

And we also have an ongoing program to find other costs reductions. We are looking for ways to offset that cost.

Senator MCCONNELL. For example, what would be some of the things you would have to do?

Mr. YOUNG. Well, in addition to looking at the purchase of power, we would have to look at reducing overhead expenses, labor expenses, and so forth, at the plants, operating the staffs more efficiently.

Senator MCCONNELL. Is there enough of that that could be done to make up for the——

Mr. YOUNG. No, sir, it is a tough problem. I mean we can partly compensate for it, but we cannot fully compensate for it.

Senator MCCONNELL. Because the kind of changes you are suggesting are really at the margin of the problem, are they not?

Mr. YOUNG. I am sorry, sir?

Senator MCCONNELL. The kind of changes you are suggesting are really at the margin of the problem. You probably could not make up for the——

Mr. YOUNG. I would say we could probably not fully make up for that increase, not without bringing the AVLIS technology into play, which is what our plan is. And with the Administration bill, where the major impact does not occur before the year 2000, we have an opportunity to be introducing the AVLIS technology to offset the impact of the clean air act.

Senator MCCONNELL. Could AVLIS come on line fast enough to offset the impact of the House version of the clean air bill?

Mr. YOUNG. Should we determine that AVLIS is deployable, which is a determination we would make in 1992, we would contemplate the AVLIS coming on in, say, 1997, or something like that, and that it would start being deployed before the full impact of the Administration bill.

Senator MCCONNELL. And my question was, under that deployment scenario, would that come on-line fast enough to offset the adverse impacts of the House version of the clean air bill, if that were to become law?

Mr. YOUNG. I think it makes it much more difficult. And it cannot offset the first years of it. And I would think it would be very difficult to affect the first five years very much.

Senator MCCONNELL. Thank you, Mr. Chairman.

Senator FORD. Thank you, Senator McConnell.

Let me just follow up on one item. The April 30th edition of "Inside Energy" mentions that DOE has asked Congress to reprogram as much as $16 million from the uranium enrichment account to pay for work related to the production of plutonium at Savannah River. Is there any truth to this report?

Mr. YOUNG. Yes, sir. The Administration has in progress a reprogramming request that would come to this committee, among others, that would propose to reprogram $16 million from power cost savings that the enterprise has achieved this year. One of the purposes would be to produce plutonium-238 at Savannah River. Another purpose would be to support proceeding with the certification of an evolutionary light water plant design. And a third purpose would be another LMR support item.

Senator FORD. Mr. Young, let me just say this to you, and I say this in all due respect. If you send that up here I am going to do everything I can to kill it. Because this is what has happened to uranium enrichment throughout the years. You keep loading on top of the cost per SWU in order to pay for something else.

Now you say that we have a $19 million surplus and you want to take that out of the department, when you could use it to reduce the cost, in my opinion. You have a surplus. You are making

money. Why don't you reduce the cost and be competitive? That is what our legislation is all about, so we can be competitive.

The things you are asking for in your budget are the same things in the bill that Senator McConnell and I are trying to pass on the House side. And hopefully we can get it done. I just do not understand the thinking. I hope it is not yours. I hope it is somebody else telling you to do it.

Mr. YOUNG. Sir, in 1990, where we are looking for the reprogramming, basically our contracts are in place. This is money that, at the end of fiscal year 1990, would go to the Treasury. We have looked at the capitalization that would be available for a Government enrichment corporation. We believe that that is quite sufficient at this point. And what we have tried to do is look at uses of fiscal 1990 funds that are available and could be used in the best interest of the Department.

Senator FORD. Mr. Young, you just made the best point that can be made for the uranium enrichment corporation. So that we can keep that money, so we can make plans for the future, and we can reduce our costs for SWUs.

Mr. YOUNG. And we already have——

Senator FORD. Do you agree with that statement?

Mr. YOUNG. I agree that there is——

Senator FORD. That is good enough.

Mr. YOUNG. No, no, no. No, sir. I did not mean to agree generally. There is money that has been set aside in the Treasury to capitalize and to support this corporation. There is more than $400 million there. We consider that sufficient for the corporation.

I agree that—my point is that in fiscal year 1990, we are trying to look at overall uses of Government funds and the needs there are for them. And our proposal will be based on that overall consideration.

Senator FORD. Mr. Young, how much do you need for environmental compliance?

Mr. YOUNG. In fiscal year 1990?

Senator FORD. Overall.

Mr. YOUNG. Overall I guess it is probably a couple of billion dollars over the years.

Senator FORD. Why not put it towards that, instead of siphoning it off?

Mr. YOUNG. We have our work planned for fiscal year 1990 and funds to be spent. These are excess funds that became available through savings in power.

Senator FORD. What about working capital for the corporation?

Mr. YOUNG. We already have an amount of working capital that is quite sufficient for forming the corporation in excess of $400 million.

Senator FORD. Well, something, as we say down home, ain't right. You talk good, but when I put the pencil to the paper, it does not come out that way, in my opinion.

Mr. YOUNG. We are trying to look at the uses that could be made of funds in fiscal year 1990 from an overall Department standpoint, and what the best uses are.

Senator FORD. How many terminations did you receive for the year 2000 of contracts for SWUs?

Mr. YOUNG. I would have to check the number, Senator. Certainly, I know we received one from—I can tell you the SWUs per year and the dollar value. I do not recall the number of customers.

Senator FORD. But these are terminations in the year 2000?

Mr. YOUNG. Yes, sir.

Senator FORD. For the record.

Mr. YOUNG. For the record, 2.7 million SWUs per year, worth about $270 million.

Senator FORD. Did they ask for these terminations or did you ask for them?

Mr. YOUNG. They asked for them.

Senator FORD. Did you try to sell or ask them why they were cancelling their contract?

Mr. YOUNG. Yes, sir. We have talked to various parties.

Senator FORD. What is their explanation?

Mr. YOUNG. Their explanation is that they see market conditions that they feel obligated to look at, in terms of their own enterprises, for possibly buying most effectively. They have expressed a concern about the long-term impact on the uranium enrichment enterprise of the cost of D&D and environmental activities and clean air and so forth.

Senator FORD. Of course, the corporation language takes care of D&D.

Mr. YOUNG. Yes, sir.

Senator FORD. That is provided for in that bill?

Mr. YOUNG. Yes, sir.

Senator FORD. Is price the only factor determining uranium enrichment purchased by DOE customers today?

Mr. YOUNG. It is becoming a much more important factor than in the past?

Senator FORD. Are there any other factors that play a role in determining a utility's choice of supplier?

Mr. YOUNG. I think price is the principal factor today. I think they are also potentially looking for shorter term contracts because of the market conditions.

Senator FORD. Mr. Young, I have kept you probably too long, but I still have a stack of questions. Please provide the committee with a short summary of the department's AVLIS plans. Specifically please note deadlines for progressing to the next stage of development, including a site selection for AVLIS.

Mr. YOUNG. Yes, sir. Overall we are targeting—we have a plan that leads to demonstration of the AVLIS process plus technologically and economically by November 1992. We also have a plan to bring along the site selection process by November 1992, when we would be able to identify a site for a possible AVLIS production plant. We would make a determination at that time whether to deploy AVLIS and in what manner and what site on which to deploy it and what schedule.

We plan to have a final decision on that matter through the NEPA process by March 1993 following the November 1992 date. We have several steps in progress to bring industrial involvement more actively into the AVLIS program. First, we have an industrial review group that is currently helping us review the development of the AVLIS to provide an industrial perspective. We are

planning an industrial access program whereby future potential industrial participants would be given for a price, access to classified information on the AVLIS process, such that they could become more educated and interested in using the AVLIS process.

Senator FORD. As I read the time schedule, you would not have these people in but for about six months, and it seems to me that if you want industry to be interested, you must include them and give them more than six months to be a participant.

Mr. YOUNG. For the industrial access program our target is to have them start becoming involved this August. We have an announcement out in the Federal Register.

Senator FORD. And then would you pick the contractor?

Mr. YOUNG. And then the second aspect, the second step in our process of bringing industrial involvement is to pick a commercial deployment contractor. For that we anticipate——

Senator FORD. That is March of 1991. That is only six months, is it not?

Mr. YOUNG. March of 1991, yes.

Senator FORD. That is six months.

Mr. YOUNG. November 1992 would be the——

Senator FORD. Six months before. Seven months, okay, seven months. Seven months that you would have them in before you pick your commercial site people, a commercial contractor.

Mr. YOUNG. You are saying the industrial access program would begin only seven months before we would be picking. Yes, that is true.

Senator FORD. So, they would not be in too long, would they?

Mr. YOUNG. No, sir. We are trying to move every one of these milestones along as quickly as we can to get industrial involvement at the earliest opportunity.

Senator FORD. It appears that they will not be in, so we are looking just at six months for—that is almost like propaganda, almost, to me.

Mr. YOUNG. We would make the information fully available.

Senator FORD. I am beginning to see all kinds of soft spots and maybe I am kind of like the little boy who ran through the cemetery at midnight and saw ghosts behind every tombstone, but I am concerned that AVLIS will become the GCEP of the nineties. What specific steps are we taking to avoid this from becoming a reality?

Mr. YOUNG. Relative to GCEP I think we will be at the demonstration stage with a lot less money involved. I think we have on the order of $500 million more to be spent before we will be demonstrating that technology. And a significant point to me, Senator, is that the AVLIS technological and economic demonstration will take place at near commercial scale. We are not dealing here with having a small scale demonstration but a big commercial scale demonstration. The AVLIS will be at approximately commercial scale when we demonstrate it, so we will know, I think, the answers a lot better than we did for GCEP.

Senator FORD. Let me wind up with a question about the independent financial analysis. DOE has spent a significant sum of money, somewhere around $2.5 million, I think, for a financial analysis to be performed by Smith Barney. What was DOE's moti-

vation for pursuing this analysis? What is the scope and what do you hope to gain by it?

Mr. YOUNG. As you know, Senator, it has been several years and the House of Representatives has not moved forward with legislation as the Senate has on the Government corporation. We felt that perhaps an independent analysis of the prospects for such a corporation by a firm such as Smith Barney would add further information—objective information—beyond what the Department of Energy or the Government would say about this corporation. We felt this subjective independent analysis would add to the facts available and would help convince the cognizant members of the House of Representatives that this Government enrichment corporation is urgently needed and is entirely justified.

We asked Smith Barney to look at all of the financial aspects of forming the corporation, and I believe their findings or their conclusions will support the corporation. I do not know their conclusions yet. They have not shared them with us, but based on what I know of the plan for the enrichment corporation, I believe their conclusions will be supportive.

Senator FORD. Is the Smith Barney study progressing on schedule?

Mr. YOUNG. Yes, sir. It is due to be released on May 15th, and we have insisted that it be released on schedule.

Senator FORD. Once the report has been made and given its importance, will you personally transmit the report to the House and Senate committee and subcommittee chairmen?

Mr. YOUNG. We will transmit the report. I think more important, this is an independent report by Smith Barney and, for example, we would look for Mr. Zarb, who is head of Smith Barney, to personally transmit this report to the members of Congress and committees that this is of interest to. I think that his independent evaluation will complement analyses that the Department has furnished. We will certainly be supportive of the report.

Senator FORD. Well, your commitment is to support the report or if it is good you will support it? If it is bad, we may be out of the ball game, is that what you are saying? But you are not willing to personally accompany the delivery?

Mr. YOUNG. Senator, I guess what I am trying to say is we have taken great pains to make it clear that this report is independent. It is not a report that the Department, you know, is determining in any way what the outcome will be. It will truly be an independent report. And while it will be done for the Department of Energy, I think it is important that not only DOE, but the top officials of the firm participate in telling the Congress the independent conclusions.

Senator FORD. I appreciate your position on that, Mr. Young. I would ask you, however, to ask the head of Smith Barney to take that report to the Chairman of the full committee.

Mr. YOUNG. I will do that, sir.

Senator FORD. Now, Mr. Reinstein, you have been sitting there quietly and comfortable and Mr. Young has been taking the lashing from everybody. We have had a discussion this morning that edged close to dumping—I am not using that word directly.

What specifically is dumping? Just tell us. Tell this country boy what dumping is so I can understand it. Try four letter words.

Mr. REINSTEIN. Basically, dumping is selling below fair market value and it is defined in two different ways under U.S. law. One basic comparison that is used in most cases is selling below comparable domestic market prices. That is, you sell the same kind of product or good either contract versus contract or spot versus spot, to your domestic customers and you sell it lower in your export market.

When there are no data available on domestic market sales to be used for price comparison, you can also do a cost of production comparison which takes into account some assumed level of profitability as well. That would be the other way of measuring it.

Now, in relation to a nonmarket economy, obviously things such as domestic prices or cost of production do not mean the same things that they mean in a market economy, and we have under U.S. law and the Commerce Department regulations and procedures a different methodology for computing dumping of imports from a nonmarket economy. You try to find a surrogate economy, a market economy in which similar kinds of production technology and cost factors and so forth are involved, and you use that market economy as a surrogate for the nonmarket economy. That is basically how it works.

Senator FORD. Is there a surrogate for Soviet uranium—enriched uranium.

Mr. REINSTEIN. My understanding is there could be a Western European surrogate, but one would have to look at the specifics of the situation, but it would have to be similar technology so that you could have some estimate of what costs might be in a market economy.

Senator FORD. What if the supply is replaced? You are a broker, and I am the Soviet Union. I am selling SWUs, so you sell your supply out and I replace it to you. Is there a way to figure that out?

Mr. REINSTEIN. Do you mean the imports come in essentially as displacement out of another market? That is a problem when you have a situation where the origin of the imports is not necessarily the source of the problem.

I am not an expert on U.S. dumping laws. I am not sure how you reach that kind of situation. There are, of course, other trade laws, other than the dumping laws, which could be used in such a situation.

You have Section 201, where you have a disruption from imports and an injury to domestic industry. That provision of law would be available to deal with imports in general from any source, so that it would not necessarily be targeted at a particular source, if in fact you had a general disruption in the market which was injuring the domestic industry.

Senator FORD. How would uranium enrichment services be classified according to trade laws? Are they products, or a service?

Mr. REINSTEIN. The product would be enriched uranium, so you would have to deal with it as an import of a commodity, enriched uranium, which would come in under the U.S. tariff schedule. Of course, services per se are not in the tariff schedule in general.

Senator FORD. Let me ask you this: what if we send uranium to the USSR and ask them to enrich that uranium and then we purchase that from them? Does that make that a product, or are we paying for services?

Mr. REINSTEIN. This would be a guess. This would not be an authoritative response, because I am not a customs expert, but my guess would be that the material coming in, enriched uranium, would be considered a different article of commerce from the original uranium—natural uranium. It would come in under a different line entry in the harmonized tariff schedule of the United States and would be considered foreign origin enriched uranium, although the original raw material might have come from the U.S.

It would be—well, let me try to think of another example. Taking crude oil and sending it over the border and having it refined and having fuel oil come back.

Senator FORD. But that is the difference there in your analysis, is that enriched uranium is only being used for one service—one product—and then you take the oil, it could be used for several.

So now you are talking about the only service, or only product that can be used is for generation—for fuel. So I think the trade laws are different, when you get down—it comes in, it only has one peculiar use, where the others have more.

Mr. REINSTEIN. I think to try to answer your basic question, if enriched uranium came into the United States from the Soviet Union it would be considered an import of enriched uranium from the Soviet Union regardless of where the natural uranium came from in the first place, because they are described under different parts of the tariff schedule. It is considered a different product. Enriched uranium, I believe, is a different product from natural uranium. I do not have a copy of the tariff schedule with me, but I believe there are separate descriptions of those two products.

Senator FORD. You mentioned—what is it, sector-specific agreements in your testimony? Have you considered a sector-specific agreement for uranium or enriched uranium product?

Mr. REINSTEIN. I do not believe any agreements affecting uranium are under consideration, senator.

Senator FORD. Well, you have not considered.

Mr. REINSTEIN. We have not considered such an agreement.

Senator FORD. USTR recently placed a notice in the Federal Register asking for comments on U.S.S.R. trade in anticipation of the upcoming trade talks between the two countries. Did you receive any comments pertaining to uranium or uranium-enrichment trade?

Mr. REINSTEIN. Not to my knowledge, but I would have to check with the people who have the material.

Senator FORD. Uranium producers sent——

Mr. REINSTEIN. Did they? I have not seen their comments.

Senator FORD. I am thinking, maybe we better have this hearing over again and give you the questions, and then maybe we can get better answers. Would you, Mr. Reinstein, send to the Committee any comment, any request, any correspondence, any verbal communication whatever about enriched uranium that you received in the context of the trade talks?

Mr. REINSTEIN. You mean during the Federal Register process?

Senator FORD. Yes—U.S.S.R.

Mr. REINSTEIN. We would be happy to provide anything we received in that process.

Senator FORD. Can you do that in a timely manner?

Mr. REINSTEIN. I would hope we could do it very quickly. I would have to go back and check with the office that conducted that hearing and see what they received, but it should not take very long at all.

[The information follows:]

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February 20, 1990

Ms. Carolyn Frank
Secretary, Trade Policy Staff Committee
Office of the United States Trade Representative
Room 523
600 Seventeenth Street, N.W.
Washington, D.C. 20506

Dear Ms. Frank:

The following comments in response to the January 29, 1990 Federal Register notice (Vol. 55, No. 19, pg. 3027) are being submitted by the Uranium Producers of America ("UPA"), an association of domestic uranium mining and milling companies.

The domestic mining and milling industry is a creature of the United States government, having been established to fulfill national security objectives and further encouraged to meet the expectations for commercial nuclear energy. Today, the industry exists without government support and serves only the needs of utilities both at home and abroad.

Past government policies and decisions, however, continue to plague the domestic industry, and it is currently suffering a complete collapse of production capability and future investment. The plight of the industry is well documented since the U.S. Department of Energy is required to assess the viability of the industry annually. For four years the industry has been declared nonviable, with almost $1 billion having been written off. See Domestic Uranium Mining and Milling Industry 1987, Viability Assessment, Energy Information Administration. The prospects for a near-term revival were considered good just last year; however, recent Soviet trade in uranium has changed the outlook considerably.

Historically, the Western or free world uranium market has been separate from the Eastern Bloc market with the exception of minor sales of services (not uranium) by the Soviet Union. Current Western world utility demand is about 110 million pounds of uranium per year. Before 1985, Western world production exceeded demand, but in 1985 and all subsequent years, demand has exceeded production, thus, drawing down utility and governmental

stocks. The shortfall in annual production is largely the result of mine and mill closures caused by falling prices. For example, domestic production has declined from a high of approximately 40 million pounds in 1979 to the current level of 10 million pounds. During the same period, uranium prices have collapsed from a high of $43 per pound to the current $9 per pound level. It is undisputed that none of the Western world suppliers can profitably produce uranium, on even a forward cost basis, at current prices.

The price collapse is largely a function of inventory liquidation into a relatively thin spot market. Unfortunately, prices in the spot market tend to influence strongly prices realized under long-term contracts. Western world suppliers, however, were able to anticipate a recovery in the early 1990s until the Soviet Union began dumping over the past year significant quantities of uranium in Western markets.

It is estimated that the Soviet Union, which until recently provided the only market for Eastern Bloc uranium production, holds inventories of at least 500 million pounds of uranium. Annual production is difficult to estimate since such data is still confidential, but is estimated to be at least 35 million pounds. From what is known, this production comes from relatively low-grade mines which, in the Western world, would have correspondingly high costs. In all probability, if these mines had been forced to compete in the Western market during the past decade, they would be shut down today like many similar mines in the United States, Canada, and South Africa; but the Soviet and Eastern Bloc mines have been supported by the Soviet Union and have not had to compete until recently. Interestingly, Czechoslovakia and Hungary have announced mine closures because the Soviet Union has ceased taking deliveries.

The Soviet Union has announced that it intends to capture in excess of 25% of the Western world market in nuclear fuel (uranium) and that its supply capability is unlimited. The motivation, of course, is to export a salable commodity to generate hard currency. If the Soviet Union proceeds with its plans and continues to dump its product in Western markets, then U.S. and other Western world producers will be forced to further abandon mines and mills. The threat of this is particularly significant to our long-term national security interests since 20 percent of our electricity is generated with nuclear power and almost no other Western country will allow its producers to supply U.S. defense needs (e.g. for its nuclear navy).

The influx of Soviet uranium into world markets has already affected not only the U.S. uranium markets but Canadian, French and British markets as well. It is having a direct impact on the enrichment operations of the U.S. Department of Energy.

Officials of the Department have expressed concern about the effect of heavily discounted Soviet sales in testimony before Congress.

We believe that any trade negotiation with the Soviet Union must encompass Soviet conduct which violates the principles of free trade. Clearly, the strategy of selling Soviet uranium at prices which bear no relation to real production costs constitutes such a violation. We believe this problem must be addressed either in the course of trade negotiations or through other diplomatic channels at the earliest opportunity.

We appreciate this opportunity to submit these comments on behalf of the Uranium Producers of America.

Sincerely,

Gerald W. Grandey

Gerald W. Grandey
President

Senator FORD. I have some questions that I am going to send to both of you, and hopefully we can communicate with your European desk counterpart and put some answers together for us that would be meaningful. I know I giving you time to digest your answer a little bit before you put it on paper, but I am not nearly satisfied with some of the answers I have gotten here today. Maybe I have not been putting them properly, but it seems that we ought to know a little bit more about what is going on.

So we thank both of you gentlemen for being here today, and questions will be submitted to both of you for answer, and it is a timely thing and I hope that we could get those answers by the time Smith Barney gets their report up here.

Thank you.

Bob Calabro, Manager, Nuclear Fuels, Tennessee Valley Authority and Gerald W. Grandey, President, Uranium Producers of America. If you two gentlemen will come forward we will move on with our testimony today.

Mr. Calabro, if you would go first, we would be delighted to hear from you. Your testimony will be included in the record in full. If you want to highlight it, that will be fine.

And, Mr. Grady, also.

You may proceed, Mr. Calabro.

STATEMENT OF BOB CALABRO, MANAGER, NUCLEAR FUEL, TENNESSEE VALLEY AUTHORITY

Mr. CALABRO. Good morning, Mr. Chairman. My name is Bob Calabro.

For the past year I have been the Manager of Nuclear Fuel for the Tennessee Valley Authority. For the previous 16 years I was manager of nuclear fuel for Northeast Utilities. In that position I was responsible for the fuel management of four nuclear powerplants.

TVA is pleased to appear before your subcommittee today and explain its present situation regarding the acquisition of enrichment services during this decade. TVA is taking a number of steps to become more efficient, productive and competitive. Overall, it has reduced the need for $800 million of revenue in the past two years. It continues to search for the most cost-efficient means to conduct its business.

TVA is currently operating two nuclear units in Tennessee, with a total capacity of 2,300 megawatts electric. TVA also owns three large licensed units in Alabama. Although these three units are not operating at the present, plans are to bring all three back online, with the first resuming operation later this year. In addition, four more units are in various stages of completion, and we expect these to be operational by the year 2000.

With nine nuclear power units operational, TVA will have an operating nuclear plant capacity of 10,250 megawatts electric, and will be using about one million separative work units annually.

At the present contract price of $118 per SWU, enrichment services will cost $118 million per year. Clearly, any steps we can take to reduce these costs will directly benefit our 3,327,000 customers in the states of the Tennessee Valley in the form of lower electric

bills. It will also improve TVA's competitive position with other utilities.

Like many other U.S. nuclear plant owners, TVA currently has a standard 30-year utility service contract with DOE for enrichment services. Under the standard contract TVA has the initial choice of buying anywhere from 70 to 100 percent of its total enrichment requirements from DOE. TVA chose 100 percent and continues to purchase all of its enrichment requirements from DOE. Seventeen U.S. utilities, however, chose a lesser obligation.

Under the current contract, TVA must purchase 100 percent of its enrichment requirements from DOE through 1995, or pay significant termination penalties.

Senator FORD. I might just say to you that you had some answers to some questions that DOE did not know this morning. So I want to compliment you on that, Mr. Calabro. [Laughter.]

Mr. CALABRO. Yes, sir.

Senator FORD. You may move forward.

Thank you.

Mr. CALABRO. However, by providing DOE with a five-year notice, TVA could reduce its obligation to purchase enrichment services from the present 100 percent level to 70 percent, beginning in 1996. In addition, the contract provides the option of terminating it altogether by giving DOE a 10-year notice.

I would like to point out that since TVA is bringing additional nuclear units on-line, its purchases of enrichment from DOE will increase, even if TVA purchases at the 70 percent level. Over the next five years, 1991 through 1995, we expect to purchase over two million SWUs from DOE.

For the following four-year period, 1996 through 1999, TVA expects to be purchasing at least three million SWUs from DOE, even if it elects to reduce its obligation to 70 percent.

As you know, today there is an excess in enrichment capacity worldwide. And this excess is expected to last until the end of this decade. Also, with today's spot market price for enrichment at $50 per SWU, compared with DOE's charges of $90 and $118 per SWU, TVA, to explore the possibilities of lowering its enrichment costs for its customers, solicited proposals from current and future enrichment suppliers.

This approach has been taken already by many other U.S. utilities. At this time, TVA is considering a number of options, including contracting with DOE.

Mr. Chairman, TVA's power system is self-financing. And it pays its own bills without federal assistance. Our customers can buy their electric power from other power companies. Unless we examine every expense from a competitive angle, we are going to lose customers. And we cannot afford that.

A number of our neighboring competitors, Duke Power, Louisiana Power & Light, Mississippi Power & Light, Carolina Power & Light, and Virginia Power, all of which have large nuclear programs, have already terminated or reduced their contractual commitments to DOE to lower their enrichment costs.

In fact, only about 50 percent of the U.S. utility enrichment requirements are now committed to DOE for the last five years of this decade.

In addition, Duke Power, Louisiana Power & Light and Northern States Power, who own and operate 11 nuclear units, have joined with Urenco and Fluor-Daniel to build a $750 million centrifuge enrichment facility near Houma, Louisiana. The enrichment facility, planned for 1996, will be capable of supplying 1.5 million SWUs per year, or 15 percent of U.S. enrichment requirements, in direct competition with DOE.

Although we want to lower the cost of electric power to our customers, we continue to be mindful of the economic well-being of the Paducah area. However, we do not believe that even if TVA elected the 30 percent reduction, employment levels at DOE's enrichment plants would be greatly affected.

As mentioned earlier, TVA's purchase of enrichment services would actually be going up, and not down. Moreover, 30 percent of TVA's expected requirements in the 1996 to 1999 time frame will average about 325,000 SWUs per year, only a small fraction of DOE's total enrichment production. Such a small reduction in demand will certainly have much less effect on employment levels than DOE's own actions during the past three years in reducing production by more than five million SWUs per year, and selling from inventory instead.

As you know, it is expected that the decades-old gaseous diffusion process will be replaced by the new, more efficient AVLIS technology in the future. TVA supports DOE's efforts to develop this process and regain a competitive position in the worldwide enrichment market.

In summary, TVA's uranium enrichment contract with DOE provides options to obtain a portion of TVA's enrichment needs elsewhere. With today's worldwide excess of enrichment at low prices, TVA is obligated to its millions of customers to investigate the opportunities for lowering its enrichment costs. This is precisely what we are doing.

I cannot tell you today what the outcome will be.

Thank you, Mr. Chairman.

Senator FORD. Thank you.

Mr. Grandey.

STATEMENT OF GERALD W. GRANDEY, PRESIDENT URANIUM PRODUCERS OF AMERICA

Mr. GRANDEY. It is an honor to address the committee. I think it has now been—going on six years since the Senate and this committee have focused on enrichment issues and issues that are important to the uranium production sector of the whole nuclear fuel cycle.

I would like to take at least this opportunity to thank not only the committee, but the committee staff for all of the involvement they have had in these issues over time.

We are here today to give our comments on the threat of Soviet enrichment, the sale of SWUs, the sale of enriched product to the not only the enrichment plan, but also to the U.S. uranium production industry. The sale of Soviet enriched products, Soviet SWUs, is something that is relatively new being faced, not only by U.S. uranium producers, but also by the enrichment facilities.

I think it comes at a particularly crucial and significant time and for U.S. producers the sale of Soviet SWU presents the proverbial straw that will break the camel's back. The enrichment enterprise I think we have seen that it will at the very least lead to declining market share, declining sales and higher costs for those people, including the defense establishment that remains with DOE.

The prospect and threat of Soviet sales of enriched product needs to be understood partly in the context of the history or this industry. As was touched upon by Senator Domenici, the industry, not only the enrichment enterprise, but also the production sector, was a creation of the U.S. Government.

Over the decade of the 1970s the U.S. Government encouraged uranium production to levels that created huge inventories that overhang the market, began to affect it. These inventories were liquidated, began to be liquidated in the early 1980s, driving uranium prices to levels far below the costs of not only U.S. producers, but producers throughout the western world.

Only through a series of very painful retrenchments in the production sector coupled with some rising demand that by U.S. and other western world utilities for uranium did supply and demand first come into balance in 1985. And since 1985 western world demand for uranium has exceeded western world production. But I would stress that that is looking only at the western world economies, only at those people who compete in western market with western market economies.

Until recently the Soviet SWU business, the enrichment business and Soviet sales has been largely independent of the western world market. The Soviet Union has provided the only market for Eastern Bloc production and the amount of Soviet SWU sales in the decade of the 1980s were relatively limited.

The advent of Soviet SWU sales, enriched product sales and the possibilities of the sale of natural uranium now comes at a particular bad time. A bad time for the U.S. production industry. Prices now are as alluded to earlier less than $10 per pound for U.S. uranium, for western world uranium, less than $9—well, less than $10 per pound, approximately $9 per pound. Of the 26 mills that were operating in the late 1970s, early 1980s, today only three mills are left operating in the United States. Where this country produced approximately 43 million pounds of uranium in the late 1970s, our 1990 production will be less than 10 million pounds. By 1993 U.S. production will be less than six or seven million pounds and expected to decline from there without a significant change in the market environment.

The Soviet Union has moved aggressively to capture a percentage of the market share, the western world market share. They have announced their intentions to penetrate at least 25 percent of the market. The motivation, of course, is to obtain hard currency for their own foundering economy.

Our best reports indicate that there are approximately 500 million pounds of uranium or uranium equivalent being held by the Soviet in Eastern Bloc countries in inventory and without any further production by the western mines and mills that inventory

level will be sufficient to supply at least four years of western world demand for nuclear fuel.

We also estimate that the Soviet Union and Eastern Bloc countries produce approximately 35 million pounds of uranium per year, a major or a large part of which would be available for sale to the western world. They have announced plans to sell, the availability to sell at least three million SWU. That is a figure that we have heard before today. That is equivalent to approximately 12 million pounds of natural uranium which exceeds all of the U.S. production for 1990, anticipated for 1990. Three million SWU is also approximately one third of DOE's annual production, and we believe that the announcement for three million SWU penetration of the U.S. market is simply a minimum figure. We believe that they are not only prepared to sell more, but they are also prepared to begin selling natural uranium in the very near future.

Last fall approximately 800,000 SWU were sold by the Soviet Union for import into the United States. This marks the largest single import of enriched uranium in the entire history of our nuclear industry. Obviously the sale by the Soviet Union of SWU, every SWU that is sold in packs, not only the DOE enrichment enterprise, it is a lost sale or a possible sale to the domestic industry.

U.S. utilities that buy Soviet SWU's are also buying Soviet uranium. This is particularly distressing because every time that a Soviet SWU is sold, not only are both sectors affected, but the health of the enrichment enterprise, as we have said repeatedly, is inextricably related to the health of the U.S. uranium production sector and vice versa.

The competition from Soviet sales is also devastating to the U.S. uranium producers because in our judgment these sales are being made at levels which bear no relationship to the cost of producing uranium or enriched uranium in the Soviet Union. In short, the Soviets are dumping both uranium and enrichment, we believe, in western markets.

Preliminary analysis by the Uranium Producers Association concludes that the Soviet Union has been dumped into the U.S. market at less than fair value, and we believe it can be demonstrated that Soviet marketing practices run afoul of the U.S. trade laws. The success of the Soviet marketing strategy obviously depends upon the willingness of certain utilities to buy Soviet uranium, natural or enriched. We believe it is ironic that at the time that the Soviet Union is cutting off energy supplies to Lithuania that sales to U.S. utilities are meeting with certain degrees of success.

We are told, of course, that state regulatory commissions want nuclear utilities to buy their nuclear fuel at the lowest possible cost, but I wonder how many commissions would willingly insist upon such a policy if they knew the end result was the devastation of the enrichment enterprise and a further collapse of what remains of the U.S. production industry. Perhaps it is time for Congress to assure that a utility's decision to buy domestic uranium and domestic enrichment will not be deemed to be imprudent just because foreign uranium is cheaper.

It is even more difficult to understand at this time the passive role demonstrated by the executive branch and the Department of

Energy in light and in the face of the Soviet challenge both to the enrichment enterprise as well as to the producers. We believe it is absurd for the U.S. Government to stand idly by and permit the Soviet Union to undermine our enrichment program and the domestic uranium industry. The administration we believe has both the opportunity in the upcoming trade discussions as well as the leverage to obtain, to address this situation, to make it a topic for these discussions, and we would urge the administration to work in concert with other countries that are similarly being devastated, those production sectors and enrichment enterprises that are being similarly affected to insist that the trade in enrichment and natural uranium be fair under our trade laws and the trade laws of other countries.

This committee just last year recognized a very important principle on its report on Senate 83, which is the latest measure passed by the Senate, now pending before the House of Representatives. The committee opined that while dependency on other nations for strategic minerals generally and for uranium in particular may bring some short-term economic gain, it also involves long-term economic and energy security risks to the nation. The emerging Soviet strategy for uranium sales in U.S. markets makes it abundantly clear how serious these risks may be.

Mr. Chairman, I thank you once again for the opportunity to appear. I would be happy to respond to any questions that you might have.

[The prepared statement of Mr. Grandey follows:]

TESTIMONY OF GERALD W. GRANDEY

PRESIDENT, URANIUM PRODUCERS OF AMERICA

BEFORE THE SUBCOMMITTEE ON

ENERGY RESEARCH AND DEVELOPMENT

SENATE COMMITTEE ON ENERGY AND NATURAL RESOURCES

May 1, 1990

Mr. Chairman and Members of the Committee, I am Gerald W. Grandey, President of Energy Fuels Corporation. I also serve as President of the Uranium Producers of America.

We welcome this opportunity to testify today about the Soviet Union's role in world uranium and uranium enrichment markets.

Just a year ago, I expressed concern before this Committee about the impact of Soviet sales of uranium and enriched uranium on the markets for domestic uranium and enrichment services. At that time, the Committee had been advised by Secretary Watkins that the Soviets had substantial excess enrichment capacity and he understood that Soviet enriched uranium was being offered in the U.S. at prices nearly 50 percent lower than the current DOE price. His comments made clear that both the domestic uranium industry and DOE's enrichment operations were at risk because of Soviet marketing activities.

Historically, the Western or free world uranium market has been separate from the Eastern Bloc market with the exception of minor sales of enrichment services by the Soviet Union. However, over the past year the Soviets have moved aggressively to market uranium and enriched uranium in U.S. and foreign markets at heavily discounted prices. The Soviet Union has announced that it intends to capture in excess of 25 percent of the Western world market in nuclear fuel. The motivation, of course, is to export a salable commodity to generate hard currency for the Soviet economy.

Current Western world utility demand is about 110 million pounds of uranium per year. Before 1985, Western world production

exceeded demand. Since 1985 demand has exceeded production, thus drawing down utility and government stocks. The shortfall in annual production is largely the result of mine and mill closures caused by falling prices. For example, domestic uranium production has declined from a high of approximately 40 million pounds in 1979 to the current level of 10 million pounds. During the same period, uranium prices have collapsed from a high of $43 per pound to the current $9 per pound level. It is undisputed that none of the Western world suppliers can profitably produce uranium, on even a forward cost basis, at current prices.

The price collapse is largely caused by inventory liquidation into a relatively thin spot market. Unfortunately, prices in the spot market have a strong influence on prices realized under long-term contracts. Thus, the sale of uranium and enriched uranium by the Soviets in Western markets has had a significant impact on all prices.

It is estimated that the Soviet Union, which until recently provided the only market for Eastern Bloc uranium production, holds inventories of at least 500 million pounds of uranium. Annual production is difficult to estimate since such data is still confidential, but is believed to be at least 35 million pounds. From what is known, this production comes from relatively low-grade mines which, in the Western World, would have correspondingly high costs. In all probability, if these mines had been forced to compete in the Western market during the past decade, they would be shut down today like many similar mines in the United States,

Canada, and South Africa.

We believe the Soviets have at least 3 million SWUs -- the equivalent of 12 million pounds of U_3O_8 -- available annually for sale in the U.S. market. That is an amount which exceeds the total current U.S. uranium production and constitutes about one-third of DOE's annual SWU production.

Furthermore, Soviet officials have made clear that 3 million SWUs is a minimum. They are prepared to sell more if the market can absorb it. They are also prepared to sell natural uranium (U_3O_8) directly into the U.S. market.

The Soviets are impacting the U.S. market in two ways. They are selling enriched uranium to European suppliers, who then ship their displaced uranium to the U.S., and they are also selling direct to U.S. utilities. Direct sales to date have been limited but could increase substantially if the Soviets continue to market at heavily discounted prices. Last fall, a uranium brokerage firm signed agreements with the Soviet and two U.S. fuel fabricators to import about 800,000 SWU in 1990. This transaction constitutes the largest single importation of enriched uranium in the history of our nuclear industry. It is a clear signal of the Soviet plan to penetrate the U.S. market on a large scale.

It should be obvious, Mr. Chairman, that every SWU imported from Russia is a sale lost both to DOE and the domestic uranium industry. Utilities that buy Soviet SWUs are also buying Soviet uranium. The fortunes of the uranium producers are inextricably linked to the competitive situation of DOE's enrichment enterprise.

The competition from Soviet sales is particularly devastating because, in our judgment, these sales are being made at prices which bear no relation to real production costs. In short, the Soviets are dumping both uranium and enriched uranium in world markets because of their desperate need for hard currency.

A preliminary analysis prepared for the UPA concludes that enriched Soviet uranium has been dumped into the U.S. market at less than fair value. We believe it can be demonstrated that Soviet marketing practices run afoul of U.S. trade laws.

The success of the Soviet strategy depends on the apparent willingness of some utilities to buy Soviet uranium, natural or enriched, with no questions asked. It is ironic that U.S. utilities should be buying Soviet energy at a time when the Soviets are using an energy embargo to subjugate Lithuania.

We are told, of course, that state regulatory commissions want nuclear utilities to buy fuel at the lowest possible price. One wonders how many commissions would order utilities to buy Soviet uranium below cost if the net result is to cripple the U.S. enrichment enterprise and speed the demise of the uranium industry. Perhaps it is time for Congress to assure that a utility's decision to buy domestic uranium will not be deemed imprudent just because imported uranium is cheaper.

The fact is that some utilities will not buy Soviet uranium and others have a policy of restricting their purchases of any foreign uranium to specified levels because they recognize that a viable domestic industry is in their interest. The fuel costs for

uranium and enrichment services comprise only seven percent of the total cost of nuclear energy. Utilities ought to think twice before trading long-term economic and security interests for modest short-term gains.

It is even harder to understand the passive role of the Executive Branch under the present circumstances. Frankly, it is absurd for the U.S. government to stand by and permit the Soviet Union to undermine its own enrichment program and the domestic uranium industry. The Administration has both the opportunity and the leverage to address Soviet uranium marketing practices in the context of ongoing trade negotiations or through other diplomatic channels. We should work in concert with other countries like Canada and France which also have been affected by Soviet dumping.

Mr. Chairman, the strategic role of uranium has long been recognized by Congress and the Executive Branch. In a recent report to the President, the Department of Commerce correctly concluded that uranium "plays a critical role in the national security and energy independence of the United States."

Almost one-half of the capital base of the U.S. power industry is invested in 100 uranium-fueled nuclear facilities that now supply almost 20 percent of U.S. electricity requirements. The relentless increase in demand for electricity dictates that new generating plants must be built, whether coal or nuclear, in the near future. But even if no new nuclear plants are built, existing reactors will burn more than 2 billion pounds of U_3O_8 in their lifetime. For these plants, there is no fuel-switching capability.

5

A long-term, secure supply of uranium is absolutely essential for their use.

In addition, U.S. defense needs must be assured. The U.S. fleet of 150 uranium-fueled submarines and the surface fleet must have sufficient uranium to assure an uninterrupted fuel supply. Neither Canada nor Australia -- the leading exporters of uranium to the U.S. -- sell uranium to the U.S. for military purposes.

In its report on S.83 last year, this Committee argued that while dependency on other nations for strategic minerals generally, and for uranium in particular, may bring some short-term economic gain, it also involves long-term economic and energy security risks to the nation. The emerging Soviet strategy for uranium sales in U.S. markets makes abundantly clear how serious those risks may be.

Senator FORD. Thank you very much. You mentioned and I think we all understand that on January 29th of this year TVA initiated a search for a spot market, for the spot market for its SWU requirements. Am I correct in summarizing from your testimony that TVA is still planning to take 70 percent of its requirements from DOE, that you are only shopping in the market for 30 percent of your requirements?

Mr. CALABRO. Sir, we are contracted for 100 percent through 1995. For the period 1996 and beyond, we have an option to reduce to 70 percent. Sir, we have not made that decision to do that yet.

Senator FORD. I understand that, but my question is, though, that in your shopping you are just looking at 30 percent of your requirements?

Mr. CALABRO. Yes.

Senator FORD. But that is just as of 1995?

Mr. CALABRO. From 1996 through 1999. It would be for 30 percent of our requests.

Senator FORD. That is the only period under your contract that you could actually reduce it anyhow, is it not?

Mr. CALABRO. One other period on ten years' notice the contract could be terminated, and that would be for the year 2000 and beyond.

Senator FORD. Are you limiting your search to enrichers or did you accept bids from brokers and traders as well?

Mr. CALABRO. We solicited from everyone in the industry which was brokers as well as primary suppliers, current and future suppliers.

Senator FORD. Is your search for enrichment services only or are you considering the purchase of enriched uranium product?

Mr. CALABRO. We solicited a proposal just for enrichment services. We have sufficient uranium in inventory.

Senator FORD. Are you limiting your search to any specific countries?

Mr. CALABRO. We did not specifically—well, the answer is yes to that in the sense that clearly South African uranium, if that was part of some arrangement, would not be of interest to us.

Senator FORD. Let me get this back again. I mean, your fingers and hands mixed up quite a bit, but I did not quite get all the answer.

Mr. CALABRO. The answer is sometimes when you deliver natural uranium to an enricher, he would in turn return enriched uranium, but with the possibility of a different origin of material than you sent him. We would not want to have South African uranium coming back, sir, but the contract would be for enrichment services.

Senator FORD. Given the nature of both the uranium and the enrichment markets with its flag and inventory trading, how do you propose to track the origin of uranium or your enriched services?

Mr. CALABRO. Generally there is a label by IEA standards, sir, that attests to exactly what the original origin of that material was.

Senator FORD. Would you accept Soviet enriched uranium?

Mr. CALABRO. We would not contract today for Soviet enriched uranium for the time periods we are interested in.

Senator FORD. What would you do tomorrow?

Mr. CALABRO. Let me elaborate a little bit. I think it will answer tomorrow as well. We consider 1996 and beyond a long-term contract. In addition to price, a major feature of a long-term contract is assurance of supply.

Senator FORD. You are buying on the spot market and consider that a long-term contract?

Mr. CALABRO. No, sir. We went out for proposals to deliver in 1996 and beyond. That would be a long-term contract and not a spot market sale.

Senator FORD. You noted in your testimony that enrichment services are available on the spot market for approximately $50 per SWU, while DOE charges more than double that amount. In your opinion, why is there such a discrepancy in the price?

Mr. CALABRO. I think there is—one, there is an excess of enrichment capacity worldwide. Two, there is an excess of enriched uranium still in storage, in inventory in utilities' hands. Utilities are trying to liquidate those inventories. Those probably are the two single biggest reasons for the low price and probably the analogous areas, natural uranium as well.

Senator FORD. How large is this excess?

Mr. CALABRO. Well, the capacity, worldwide capacity, is probably almost double what today's demands are today if you include Oak Ridge.

Senator FORD. Run that by me one more time.

Mr. CALABRO. Worldwide capacity generation, capacity of separate work units is approximately double of what the actual demand is today, including the shutdown enrichment facilities.

Senator FORD. How much would be available to be produced at $50 a SWU?

Mr. CALABRO. I think that is sometimes a judgment on a particular producer's part. There are things called incremental costs of production. We have seen the DOE have a two-tier pricing system based on something called an incremental cost of production. I really cannot make a judgment as to what the lowest level someone might be willing to produce or can produce in order to still be able to make a profit.

Senator FORD. Well, let me ask you this. What would your recommendations be to DOE to improve its competitiveness in the market and make themselves more attractive to their customers?

Mr. CALABRO. First, I think they are doing all they can with the existing diffusion plants. There is no question that that is a very old technology, and they are suffering from that technology in the marketplace.

I think from a long-term point of view the most important thing for DOE to do is to get the AVLIS technology in place and be very commercially competitive. And we support that.

Senator FORD. Would restructuring help?

Mr. CALABRO. We think so, yes, sir. I think that would give DOE the flexibility that it would need to compete in the marketplace that is highly competitive.

Senator FORD. TVA has consistently stated its support for the continued development, as you just said, of AVLIS, laser enrich-

ment technology. However, the development of this technology takes money.

Like TVA DOE is self-supporting. It cannot outspend its revenues. Like TVA, DOE must respond to a customer's needs. Of course, you all do not have to go to a public service commission to increase your rates or reduce them. You have to respond to your customers. However, you have a chance of losing them. Seventeen utilities have terminated all or part of their contract with DOE. DOE needs more money, but will have fewer customers and someone has to pay for the AVLIS.

Now, I would like your comments on this problem. How do you believe that this dilemma can be solved and what role will TVA play as a part of the solution?

Mr. CALABRO. Well, sir, clearly like any business—and DOE has to be operating as a business today. You have to take a good fraction of your monies today and put them into research and development in order to exist for the long term. And there is no question that that has to be done. I think if it is not done, it is very possible that there may not be an enrichment business in the United States and DOE in the future.

All businesses suffer from that precise dilemma of being able to put money in——

Senator FORD. That is just another argument for restructuring. I would—go ahead, I am sorry.

Mr. CALABRO. What can TVA do? TVA clearly has been supporting AVLIS. We support the restructuring. We would be very happy to have AVLIS clearly in our region as well.

Senator FORD. You have a couple of shots at it anyhow.

Mr. CALABRO. Yes, sir. I think what we could be supportive of DOE and help that AVLIS process, but sometimes there is very little a customer can do in order to support a particular industry.

Senator FORD. Let me ask you this. TVA is a government corporation, am I correct?

Mr. CALABRO. Yes, sir.

Senator FORD. Similar to what we are asking for the enterprise?

Mr. CALABRO. I think that is right, sir.

Senator FORD. You are probably a little more independent than we are asking for in this legislation. I mean, we would be more independent the other way, probably, I am sorry. So that indicates to me that we are on the right track, and let us hope that Smith Barney's report is favorable and we have a couple of weeks to wait for that, and then we have the commitment from the department to at least accompany Smith Barney to support their study.

Mr. Grandey, let us briefly run over your testimony just a minute. Let me ask you a question. You said that the Soviets will attempt to capture 25 percent of the western world market for nuclear fuel, and you mean uranium or enriched uranium product we referred to as EUP?

Mr. GRANDEY. Reduce all natural uranium equivalents. The form after a while does not make a whole lot of difference because it all starts with natural uranium. When I speak of 25 percent, I am reducing it all to natural U 308.

Senator FORD. Do you have a source of that information?

Mr. GRANDEY. The only source that we have been able to really look at are comments, statements made by representatives of the Soviet marketing agency, TEXNEV export and various conferences that have been held throughout the world, one recently in Nashville, Tennessee, another one in London about a year ago, associated with the nuclear fuel industry.

Senator FORD. What is your judgment as to why the Soviet EUP is sold at prices that are 40 to 50 percent less than other suppliers' prices?

Mr. GRANDEY. I think the motivation is to capture market share and develop hard currency.

Senator FORD. Well, you mentioned that a preliminary analysis has been done which concludes that the Soviets are dumping uranium into U.S. markets. Is that analysis available to the committee?

Mr. GRANDEY. Mr. Chairman, it is not at this point in time. What we have tried to do is evaluate our options as producers to see. When you look at the entire spectrum of the cost of producing enriched uranium which is the commodity that has been imported to the U.S. so far, breaking it down into its components of natural U_3O_8 conversion and enrichment, our analysis based upon the limited information we have available to us and to some degree it is an educated guess about the nature of Soviet minds and processes, we do not see any way that they can be doing other than dumping by the definitions given to the committee earlier enriched material to the United States. But that is based upon some very, very preliminary information.

We are doing our best with consultants and otherwise to obtain better information as we decide just what alternatives and remedies are available to us as U.S. producers.

Senator FORD. You mentioned in your testimony 800,000 SWUs that were available from the U.S.S.R. to the U.S. Is it correct? Is my understanding correct that those 800,000 SWUs are on this shore now?

Mr. GRANDEY. That I am not sure of. The agreement was entered into. My information says last fall. The delivery time was sometime in the spring of this year, and whether it has actually arrived on shore or not, I am not sure.

Senator FORD. Well, there has been some question of reliability. You know, you want to be sure everything that you are purchasing reliable and the broker is saying there it is, go up there and look at it and buy it. It is already here, and that answers the reliability question. I think you will check and find that what I have just said is reasonably correct.

Mr. GRANDEY. As far as I know, it is only a matter of a month or two before it was on shore, and the reason was exactly that, reliability of supply.

Senator FORD. It is on shore and that answers the reliability question. In your testimony you seemed to imply that the Congress should restrict a utility's choice of nuclear fuel suppliers. Is that what you are proposing?

Mr. GRANDEY. No. I think that what we ought to do is give the nuclear fuel utilities the ability to look at considerations other than just price, that security of supply reliability of supply, long-term contract arrangements either for enrichment or for natural U_3O_8

are important considerations other than just lowest cost, lowest price. I think when we urge that Congress act and allow utilities to defend purchases on something other than what PUCs insist upon, which is lowest cost, but that would be a step in the right direction.

TVA has that authority, but we are constantly told by other utilities that their PUCs insist upon lowest cost purchases.

Senator FORD. Are you asking us to legislate over what state commissions do?

Mr. GRANDEY. I think we ought to give the utilities the authority through congressional legislation the ability to enter into contracts with U.S. producers or enrichment enterprises with considerations other than just cost taken into account.

Senator FORD. In other words, a premium for buying American?

Mr. GRANDEY. It may result in a premium. It may simply result in the ability for the utility to argue that paying a little bit more today is a prudent decision for security of supply reasons and the possibility that you may pay a lot more later.

Senator FORD. I believe, Mr. Grandey, if I am correct that it is probably in this agreement with the whole environment of the Soviet trade agreement. Would you agree with that analysis of that thought?

Mr. GRANDEY. Mr. Chairman, it seems to be the drift.

Senator FORD. And the Canadian trade agreement.

Mr. GRANDEY. The Canadian trade agreement is something the producers were not extremely happy about. The reason for that is, it allowed the historic practices of subsidy to impact our early market, something that we adjusted to and had to live with. We were just beginning to see the light at the end of the tunnel, having retrenched and adjusted our own production levels to accommodate further Canadian imports.

We are now being faced with the threat of Soviet uranium coming in at, again, subsidized levels, levels far below their production costs.

Senator FORD. Well, I am one of eight or nine, I think, that voted against the Canadian trade agreement. It is like my vote against the Panama Canal treaty. It looks better every day.

Either one of you have any statements you want to make before we close? I see a man out there saying no. Mr. Calabro, you got through this without getting bruised too much. [Laughter.]

As long as you do not lose your good humor.

Mr. CALABRO. Mr. Chairman, I think you did that because you knew today was my 1-year anniversary at TVA.

Senator FORD. Well, my friend, I am going to be a pussycat with you today, and then I am going to ask you back someday when I am warm. But I do thank you. This is a very sensitive situation. It is a situation that is important to this country and long term. It is important to this country more than just any local area, and I am very concerned about the track we are on.

It seems like if we have a good trade agreement in the minds of the administration, it is one that we get the hell beat out of us in. If we do not come out on the short end of the pole, then it has not been a good trade agreement. I think it is about time we started getting one that was good for us for a change instead of good for them.

I do thank you all for coming today. We are going to do our best, Mr. Grandey, to continue down this six-year pike that we have been on, and maybe you can begin to return. We may put a candle at the end of the tunnel, and there may be a little light down there, but we will see within two weeks how well we are doing, and hopefully we can begin to proceed with doing the things that we ought to do.

Thank you, Mr. Calabro and Mr. Grandey, and this hearing is adjourned.

[Whereupon, at 11:35 a.m., the hearing was adjourned, subject to the call of the Chair.]

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APPENDIX

RESPONSES TO ADDITIONAL QUESTIONS

Department of Energy
Washington, DC 20585

June 20, 1990

The Honorable Wendell H. Ford
Chairman, Subcommittee on Energy
Research and Development
Committee on Energy and Natural Resources
United States Senate
Washington, D.C. 20510

Dear Mr. Chairman:

On May 1, 1990, William Young, Assistant Secretary for Nuclear Energy gave testimony before your subcommittee on the Department of Energy's Uranium Enrichment Program.

Following that hearing, you, as well as Senator McClure and Senator Johnston, submitted written questions for our response to supplement the record. Enclosed are answers to those questions.

If you have any questions, please have your staff call Lillian Owen at 586-8687. She will be happy to assist you.

Sincerely,

Jacqueline Knox Brown
Assistant Secretary
Congressional and Intergovernmental Affairs

Enclosures

QUESTIONS FROM CHAIRMAN FORD

Clean Air

Question 1: What percentage of total production costs does power account for?

Answer: Power accounts for approximately seventy-five percent of the production costs at the gaseous diffusion plants.

Question 1(a): How much of this power is supplied by coal-fired plants?

Answer: About seventy percent of the power is supplied from three coal-fired power plants. Two of these plants Clifty Creek and Kyger Creek are owned by the Ohio Valley Electric Corporation, with the third plant, Joppa, owned by Electric Energy Incorporated. The remaining thirty percent is purchased on the spot market with most of this power generated by coal-fired plants.

QUESTIONS FROM CHAIRMAN FORD

Clean Air

Question 1(b): What was the average emission rates for sulfur dioxide in pounds per million BTU for each of the three plants in 1985? In 1989?

Answer: The emission rates for sulfur dioxide in 1985 and 1989 for each of the three plants that supply electricity to the Department's uranium enrichment plants are shown in the following table:

	Average SO2 Emissions (pounds/million BTU)	
	1985	1989
Clifty Creek*	5.61	5.89
Kyger Creek*	5.76	6.15
Joppa**	3.30	3.31

*Ohio Valley Electric Corporation

**Electric Energy Inc.

QUESTIONS FROM CHAIRMAN FORD

Clean Air

Question 2: S.1630 will require each of the three plants to reduce SO2 emissions significantly. Please discuss with the Committee your plans for accomplishing this. What control method will you use? How much will this cost for each plant? When will that cost be incurred?

Answer: The three coal-fired powerplants that provide electricity to the Department's enrichment facilities are owned and operated by two utilities, the Ohio Valley Electric Corporation (OVEC) and Electric Energy Incorporated (EEI). The Department is working closely with OVEC and EEI to understand the potential cost impact of reducing SO2 emissions at their coal-fired powerplants. However, OVEC and EEI will be responsible for reducing SO2 emissions and developing plans to accomplish this.

In order to reduce SO2 emissions consistent with the limits specified in S.1630, the two OVEC coal-fired powerplants, Clifty Creek and Kyger Creek, may have to utilize flue gas desulfurization technology, commonly referred to as scrubbers. However, OVEC officials feel that there is a possibility that the SO2 emission reductions can be met by switching to low sulfur coal. EEI has initially concluded that the SO2 emissions limit can be met at their Joppa coal-fired powerplant with scrubbers or by switching to low sulfur coal use. We understand that switching to low sulfur coal is

Answer 2
(continued): EEI's initial preferred approach to meet SO2 emission reductions at the Joppa plant because it gives them greater flexibility for future operations and allows more time for advanced technology applications to be proven.

If scrubbers are used at the OVEC plants to meet the SO2 emissions limit in S.1630, the capital costs to install the scrubbers is estimated to be $269 million and $238 million, respectively, for the Clifty Creek and Kyger Creek plants. In addition, annual operating cost increases associated with the use of scrubbers would be $49 million for the Clifty Creek plant and $43 million for the Kyger Creek plant.

Currently, capital costs at the EEI Joppa plant that allows for low sulfur coal use is estimated to be $242 million. These costs are associated with modifications that have to be made for coal storage and handling, coal preparation, boiler modifications and electrostatic precipitator fly ash collection and disposal. Additional annual operating cost increases associated with the use of low sulfur coal are expected to be $23 million.

DOE would begin to pay for the costs of reducing SO2 emissions at the OVEC and EEI coal-fired powerplants as part of its electricity costs beginning in the mid-1990s when the emission equipment is placed in service and modifications are made.

QUESTIONS FROM CHAIRMAN FORD

Clean Air

Question 2(a): What additional cost per SWU is likely to result from the enactment of clean air legislation similar to S. 1630?

Answer: We estimate that the Senate's Bill (i.e. S.1630) will increase the power cost to the Department's enrichment plants by about $11 per SWU for Phase I (i.e. by 1995) sulfur dioxide emission limits, eventually increasing to about $17 per SWU when Phase II (i.e. by 2000) sulfur dioxide limits become effective. The control of nitrogen oxides emissions will add about $3 per SWU, resulting in a total increase of $20 per SWU.

QUESTIONS FROM CHAIRMAN FORD

Clean Air

Question 3: The House Energy and Commerce acid rain plan hits the DOE enrichment program much harder than the Senate bill. Please discuss the requirements of the House proposal -- are they technically feasible? What control method will you use? How much will it cost for each plant? When will that cost be incurred?

Answer: The House Bill would require the Clifty Creek, Kyger Creek, and Joppa plants to meet a sulfur dioxide emission limit of 0.4 pounds per million BTU by 1996 as compared to the Senate bill which requires meeting sulfur dioxide emission limits of 2.5 and 1.2 pounds per million BTU by 1997 and 2000, respectively.

All three plants would have to utilize scrubbers in order to meet the lower emission limit in the House Bill. We understand that it is technically possible to meet the House emission limit, however, the scrubber technology required to meet the 0.4 pounds per million BTU limit has not been used on a large scale to date.

Capital costs associated with the scrubbers required by the House version for sulfur dioxide control would be $255 million, $302 million, and $267 million for the Joppa,

Answer 3 (continued): Clifty Creek, and Kyger Creek plants, respectively. The capital cost of scrubbers to meet the emission requirements in the House bill are larger then those associated with scrubbers to meet Senate emission limits because the House limits are lower, requiring greater emission reduction. The additional annual operating cost increases associated with the use of scrubbers to meet the House emission limit is about $39 million, $57 million, and $50 million for the Joppa, Clifty Creek, and Kyger Creek plants, respectively.

DOE would begin to pay for these costs to meet the House emission limits starting in 1996 when the equipment must be placed in service.

QUESTIONS FROM CHAIRMAN FORD

Clean Air

Question 3(a): What additional cost per SWU is likely to result from the enactment of clean air legislation similar to the House Energy and Commerce Committee proposal?

Answer: We estimate that the House Bill will increase the power cost by about $20 per SWU starting in 1996 in order to meet the sulfur dioxide emission limits. This $20 per SWU increase will take place starting in the mid-1990s as compared to the Senate Bill which is estimated to result in an $11 per SWU cost increase in the mid-1990s and a $17 per SWU increase by the year 2000. As with the Senate Bill, the control of nitrogen oxides emissions will add about $3 per SWU bringing the total increase due to the House Bill to $23 per SWU.

The House Bill requires a sulfur dioxide emission limit of 0.4 pounds per million BTU by 1996 as compared to the Senate Bill which requires meeting sulfur dioxide emission limits of 2.5 and 1.2 pounds per million BTU by 1997 and 2000, respectively. We estimate the House Bill will increase our costs, as compared to the Senate Bill, by about $600 million over the 1996 to 2000 time period. An additional $200 million will also be incurred over the 2001 to 2005 timeframe associated with the higher operating costs incurred to meet the lower (0.4 pounds per million BTU versus 1.2 pounds per million BTU) sulfur dioxide emission limit.

QUESTIONS FROM CHAIRMAN FORD

Clean Air

Question 3(b): Has DOE voiced its opinion on this proposal to Committee leaders in the House? In writing? Please provide the Senate Energy Committee with any written comments provided to the House Energy and Commerce Committee or any of its Members regarding the effect of clean air legislation on the uranium enrichment program.

Answer: Though no formal opinion has been transmitted in writing, DOE has informed the House Energy and Commerce Committee that the emission limits in the House bill results in a nearly 20 percent higher cost of production for the uranium enrichment enterprise. Also, we have indicated that the House bill results in about $600 million in added costs from 1995 through 2000 because of SO2 emission limits that are much lower than limits identified in the Administration's or the Senate's bill. The House bill requires an SO2 limit of 0.5 pounds per million BTU in 1993 as compared to 2.5 and 1.2 pounds per million BTU required in 1995 and 2000 respectively in the Administration's and the Senate's bill. Since DOE's enrichment enterprise is facing significant competition from other suppliers and larger potential market share losses, any upward cost pressure jeopardizes its ability to provide a return to the taxpayer while serving U.S. national and energy security needs for enriched uranium. Finally, it has been highlighted that it seems inequitable

Answer 3(b) (continued): that the House bill specifically targets only three coal-fired plants in the entire country for the lower emission limits and these targeted plants are the ones that provide electricity to the Department's enrichment facilities.

Question 4: In your response to questions following your confirmation hearing, you indicated that an analysis of the impact of acid rain legislation on the enterprise would be completed by December 1989. Was that analysis completed? If so, would you please provide the Committee with a copy of it?

Answer: Yes, our analysis of the impact of acid rain legislation, bases on the Administration's Bill, was completed in late 1989. This analysis consisted of a detailed study of the feasibility of implementing acid rain control technologies at the three coal-fired powerplants which will supply about 70 percent of the electric power to the gaseous diffusion plants, followed by an analysis which presented the impact of the preferred technologies on the cost of power. We will provide the Committee with copies of these two documents.*

We are in the process of conducting a comprehensive study which compares the impacts of the Administration, Senate, and House acid rain legislation on the Department's uranium enrichment enterprise. We will also provide the Committee with a copy of this report when it has been completed.

*The documents have been retained in subcommittee files.

POWER COST AND AVAILABILITY PROJECTIONS FOR THE GASEOUS DIFFUSION PLANTS 1990 TO 2009

JANUARY 1990

U.S. DEPARTMENT OF ENERGY

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INTRODUCTION

The cost of electricity represents approximately 70% of the production cost of enriched uranium using the gaseous diffusion process. Two gaseous diffusion plants (GDPs) provide enriched uranium for the DOE. They are the Paducah (Kentucky) Gaseous Diffusion Plant and the Portsmouth (Ohio) Gaseous Diffusion Plant. Electric power is presently supplied to the Paducah GDP by Electric Energy, Inc. (EEInc.), and the Portsmouth GDP is supplied by the Ohio Valley Electric Corporation (OVEC). A contract exists with the Tennessee Valley Authority (TVA) to supply power to Paducah, but the contract demand has been reduced to zero under the terms of the TVA/DOE settlement.

For enrichment enterprise studies performed during FY 1989, the projected costs of power supplied to the GDPs were described in a previous DOE report.[1] For similar studies to be performed during FY 1990, an update of the expected power costs and availabilities over the next twenty years has been prepared (Tables 1 through 5) describing two scenarios for both firm and nonfirm power. A case assuming no acid rain legislation and a case assuming acid rain legislation are the two scenarios included. The cost projections at Paducah are consistent with the new EEInc. contract which became effective on December 1, 1987. The new contract extends through 2005 and continues to allow DOE use of EEInc.'s Joppa generating facility on a cost-sharing basis with the sponsors. Under terms of the contract, DOE is entitled to 75% of the Joppa plant's annual generation through CY 1994. After CY 1994 DOE's share of Joppa generation is reduced to 60% (75% of 80%) of the total generating capacity. This reduction reflects the five-year notice of cancelation received from Kentucky Utilities Company for their 20% share of the total Joppa plant output. The EEInc. contract provides DOE a mechanism to purchase nonfirm power from the EEInc. sponsoring companies and other interconnected utilities. Although the current OVEC contract expires in 1992, cost projections at Portsmouth assume the contract will be extended under essentially the same terms as the current contract.

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[1]U.S. Department of Energy, Power Cost and Availability Projections for the Gaseous Diffusion Plants 1989 to 2008, December 31, 1988.

2

ACID RAIN LEGISLATION

Several acid rain amendments to the Clean Air Act have been introduced into the 101st Congress. The bills differ in implementation methods and times but basically all seek to achieve a sulfur dioxide (SO_2) emission reduction of approximately 10 million tons from the baseline year's emissions. Baseline emissions will be determined from plant operating levels during a chosen year, presently considered to be 1980 or 1985. The oxides of nitrogen (NO_x) reduction is not as clear-cut and varies between 0 and 4 million tons from the baseline year's emissions, depending upon the bill. Baseline emissions for SO_2 are set at either 1.0 or 1.2 pounds per million Btu (lb/mmBtu). NO_x restrictions may vary for different types of boilers, exclude certain types of boilers, apply only to new plants, or require reductions across the board. NO_x baseline emissions are either unspecified, 0.4, 0.6, or 1.0 lb/mmBtu, depending on boiler type.

The bills are all structured in two phases usually requiring that approximately half (between 35% and 58%) of the reduction be achieved in the first phase. Depending upon the legislation, the time frames vary from first phase completion as early as 1994 to as late as 1997 and second phase completion between 1998 and 2004.

The bills currently being debated in Congressional Committees are the Administration bill (H.R.3030) in the House and the Mitchell-Baucus bill (S.1630) in the Senate. Chief features of the bills include an emissions cap and a provision for emissions trading. They both have a Phase I SO_2 reduction level for all plants over 100 megawatts (MW) of 2.5 lb/per mmBtu. This will affect approximately 107 plants. In the second phase, all plants over 75 MW will have to reduce SO_2 emissions to 1.2 lb/mmBtu. The bills generally allow for any means of emissions reduction, which could include fuel switching, conservation programs, retirement, changes in utility dispatch, emissions trading, and Clean Coal Technology programs as well as technology based systems of emission reduction. NO_x reduction levels are not well-defined in the Administration bill which requires an overall reduction of 2 million pounds. The Mitchell-Baucus bill sets different reduction levels depending upon the type of boiler. S.1630 and H.R.3030 do not include provisions for grandfathering of plants, cost-sharing, or an Acid Rain Deposition Control Fund. Appendix A reviews the technology options that might be used to satisfy acid rain restrictions.

The analysis and estimation of costs of the emission reduction technologies were based on a set of requirements which are common to all bills proposed in Congress and assumed to be a part of any final acid rain legislation. This analysis of the capital and operating costs for the OVEC and EEInc. plants was performed by PEI Associates.[2] The

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[2]PEI Associates, Inc., Evaluation of Acid Rain Controls on Power Suppliers for DOE Gaseous Diffusion Plants, November 1989.

assumed SO_2 emission requirements for the acid rain legislation scenario reduce plant emissions in Phase I of the legislation to 2.5 lb/mmBtu by 1996, and in Phase II to 1.2 lb/mmBtu by 2001. The assumed NO_x emission requirements for the acid rain legislation scenario reduce plant emissions in Phase II to 0.4 lb/mmBtu for dry-bottom boilers and 1.0 lb/mmBtu for wet-bottom boilers by 2001.

The capital and operating costs for complying with the acid rain legislation scenario are based on logical steps and technology selections to meet the assumed regulatory requirements for emissions. These assumptions should reasonably predict the effects resulting from the final acid rain legislation. The development of an "Acid Rain Deposition Control Fund" has been eliminated from this analysis since currently proposed bills before Congress do not include this provision.

4

FIRM POWER

Table 1 lists the projected availability of firm power for the GDPs. The unit power costs described in this report are directly related to the projected availability of power. As indicated, only EEInc. power is currently under contract beyond FY 1992, although DOE expects to extend the OVEC contract at approximately 1950 MW. The availability of firm power, at reasonable rates, from sources other than EEInc./OVEC is projected to decrease significantly beginning in the mid-1990s as excess generating capacity declines.

A. Costs With No Acid Rain Legislation

Table 2 lists the demand and energy unit costs assuming no new acid rain legislation. Demand and energy charges for FY 1990 are based on November 1989 data and are expressed in FY 1990 dollars. For FY 1990, the TVA/other rates were based on TVA keeping its FY 1989 rate constant, while the EEInc. and OVEC costs are based on utility information. All costs beginning in FY 1991 are in constant FY 1991 dollars.

For TVA/other, demand and energy charges in FY 1991 were assumed to increase by 3% to reflect an increase (in FY 1991 dollars) that is less than inflation (4%). FY 1992 assumes TVA demand/energy increases 3% to support revenue needs. From FY 1993-1994 demand increases 3% per year to reflect TVA's increased capital needs to support bringing nuclear units back on line. Energy costs remain constant (in constant dollars) until reserve margins begin to decrease in FY-1995. From FY 1995 to FY 2000, energy costs increase 3% per year assuming suppliers are operating higher on the fuel ladder more of the time. Demand also increases at 3% per year during FY 1995 to FY 2000 to reflect needed life extension programs[3] undertaken at the coal-fired stations and more expensive new capacity being added to keep power availability at projected (Table 1) levels. In FY 2000 energy costs level off as new capacity additions keep generation reserve margins from decreasing further. The projected availability of power generation after FY 2000 decreases allowing the demand charge to level off.

For EEInc., the increase in the unit cost of energy for FY 1991 allows for some increase in coal costs as the current spot market is depleted. Coal costs are assumed to remain relatively constant over the remainder of the campaign. EEInc. and OVEC both have excellent maintenance programs, and both companies have stated that these continuous efforts essentially eliminate the need for major life extension programs during the next twenty years. The costs associated with this continuous maintenance are included in the demand costs, and no additional costs are considered necessary.

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[3]Report of the Advisory Committee on the Tennessee Valley Authority to the Southern States Energy Board, September 1987.

TABLE 1

FIRM POWER AVAILABILITY (1)
WITH AND WITHOUT ACID RAIN LEGISLATION
UNDER CONTRACT / (PROJECTED)
(MW-YRS)

	PADUCAH (2)			PORTSMOUTH
FY	EEInc (3)	TVA	OTHER (4)	OVEC
1990	640	(1,350)	(960)	1,984
1991	635	(1,350)	(965)	1,984
1992	635	(1,350)	(1,350)	1,984
1993	635	(1,350)	(1,350)	(1,984)
1994	540 (5)	(1,350)	(1,350)	(1,984)
1995	508	(1,350)	(1,250)	(1,984)
1996	508	(1,350)	(1,150)	(1,940)
1997	508	(1,350)	(1,050)	(1,940)
1998	508	(1,350)	(950)	(1,940)
1999	508	(1,350)	(850)	(1,940)
2000	508	(1,350)	(750)	(1,940)
2001	508	(1,250)	(650)	(1,940)
2002	508	(1,150)	(550)	(1,940)
2003	508	(1,050)	(450)	(1,940)
2004	508	(950)	(350)	(1,940)
2005	508	(850)	(250)	(1,940)
2006	(508)	(750)	(150)	(1,940)
2007	(508)	(650)	(50)	(1,940)
2008	(508)	(550)	0	(1,940)
2009	(508)	(450)	0	(1,940)

NOTES:

1. Estimates of unit power costs on following pages based on availability projected above.
2. Total Paducah power limited to 3040 MW plant capacity.
3. Estimate of contract "demand" (DOE % of Joppa's output).
4. The purchase of OTHER firm power may have to be reduced by the quantity of power purchased from TVA (up to about 700 MW, depending primarily upon assumed Shawnee generation levels) until the Paducah area transmission system is upgraded.
5. EEInc. power subject to contract termination provisions beginning January 1, 1994.

TABLE 2

FIRM POWER
UNIT POWER COST PROJECTIONS TO GDPs
WITHOUT ACID RAIN LEGISLATION
(Constant 1991 Dollars)

Fiscal Year	FIRM POWER (Mill/kWh) (1) TVA/OTHER Demand	TVA/OTHER Energy	TVA/OTHER Total	EEInc. (2) Demand	EEInc. (2) Energy	EEInc. (2) Total	OVEC (3) Demand	OVEC (3) Energy	OVEC (3) Total	Fiscal Year
1990 (4)	15.7	20.5	36.1	7.5	17.1	24.5	5.4	10.5	15.9	1990
1991	16.1	21.1	37.2	9.5	18.7	28.2	6.1	12.0	18.1	1991
1992	16.6	21.7	38.3	9.5	18.7	28.2	5.8	12.0	17.8	1992
1993	17.1	21.7	38.8	9.5	18.7	28.2	5.8	12.0	17.8	1993
1994	17.6	21.7	39.4	9.5	18.7	28.2	5.8	12.0	17.8	1994
1995	18.2	22.4	40.5	9.5	18.7	28.2	5.8	12.0	17.8	1995
1996	18.7	23.0	41.7	9.5	18.7	28.2	5.9	12.0	17.9	1996
1997	19.3	23.7	43.0	9.5	18.7	28.2	5.9	12.0	17.9	1997
1998	19.9	24.4	44.3	9.5	18.7	28.2	5.9	12.0	17.9	1998
1999	20.5	25.2	45.6	9.5	18.7	28.2	5.9	12.0	17.9	1999
2000	21.1	25.9	47.0	9.5	18.7	28.2	5.9	12.0	17.9	2000
2001	21.1	25.9	47.0	9.5	18.7	28.2	5.9	12.0	17.9	2001
2002	21.1	25.9	47.0	9.5	18.7	28.2	5.9	12.0	17.9	2002
2003	21.1	25.9	47.0	9.5	18.7	28.2	5.9	12.0	17.9	2003
2004	21.1	25.9	47.0	9.5	18.7	28.2	5.9	12.0	17.9	2004
2005	21.1	25.9	47.0	9.5	18.7	28.2	5.9	12.0	17.9	2005
2006	21.1	25.9	47.0	9.5	18.7	28.2	5.9	12.0	17.9	2006
2007	21.1	25.9	47.0	9.5	18.7	28.2	5.9	12.0	17.9	2007
2008	21.1	25.9	47.0	9.5	18.7	28.2	5.9	12.0	17.9	2008
2009	21.1	25.9	47.0	9.5	18.7	28.2	5.9	12.0	17.9	2009

NOTES:
1. Unit costs based on projected availability.
2. Does not include costs to modify the Paducah area transmission system.
3. Assumes contract extended under current terms and conditions.
4. FY 1990 in 1990 dollars.

In much the same fashion, the OVEC costs anticipate a slight increase in coal costs as indicated by the 1.5 mill/kWh increase in energy costs for FY 1991 and beyond. No life extension program costs were factored into the OVEC costs as explained above. In FY 1996 and beyond an additional 0.1 mill/kWh increase in the unit demand charge is included to account for a decrease in the assumed power availability from 1984 MW to 1940 MW.

B. Costs With Acid Rain Legislation

As described earlier, the scenario for acid rain legislation is assumed to restrict the SO_2 emission from OVEC's Kyger Creek and Clifty Creek plants and EEInc.'s Joppa plant to 2.5 lb/mmBtu by FY 1996 and to 1.2 lb/mmBtu by FY 2001. NO_x restrictions of 1.0 lb/mmBtu at OVEC's plants and 0.4 lb/mmBtu at EEInc.'s plant would also become effective by FY 2001.

Specific methods to meet SO_2 and NO_x standards by TVA/other sources of firm power have not been identified. A gradual increase in unit costs, as shown in Table 3, from FY 1991 through FY 2000 is projected to result from a combination of increased capital investment, higher fuel costs and/or plant derating to comply with acid rain restrictions.

Compliance with the Phase I emission restrictions is assumed to be accomplished by different methods for EEInc. and OVEC. The methods chosen for analysis are based on options as evaluated by PEI Associates[4] that comply with the assumed acid rain scenario. These options do not necessarily reflect the actual choices EEInc. and OVEC would make to comply with the emission reductions.

EEInc. could comply with the Phase I emission target by increasing their use of low sulfur coal. Presently Joppa burns a 50/50% blend of high/low sulfur coal. Increasing this blend to 25/75% will reduce SO_2 emissions from 3.4 lb/mmBtu to 2.3 lb/mmBtu. This fuel substitution by Joppa increases demand charges by 0.5 mills/kWh[5] and increases energy charges by 1.1 mills/kWh for the period FY 1996-2000, as shown in Table 3. EEInc. could comply with the Phase II emission target by switching to 100% low sulfur coal. Coal switching will reduce SO_2 emissions from 2.3 lb/mmBtu in Phase I to 1.1 lb/mmBtu. Installation of a low NO_x combustion system will reduce NO_x emissions from 0.6 lb/mmBtu to 0.4 lb/mmBtu. The use of 100% low sulfur coal by Joppa and the installation of NO_x

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[4]PEI Associates, Inc., Evaluation of Acid Rain Controls on Power Suppliers for DOE Gaseous Diffusion Plants, November 1989.

[5]Estimated at $ 29/kW installed, 1098 MW generation capacity, recovered at 9%, 15 years.

TABLE 3

FIRM POWER
UNIT POWER COST PROJECTIONS TO GDPs
WITH ACID RAIN LEGISLATION
(Constant 1991 Dollars)

FIRM POWER (Mill/kWh) (1)

Fiscal Year	TVA/Other			EEInc. (2)			OVEC (3)			Fiscal Year
	Demand	Energy	Total	Demand	Energy	Total	Demand	Energy	Total	
1990 (4)	15.7	20.5	36.1	7.5	17.1	24.5	5.4	10.5	15.9	1990
1991	16.1	21.1	37.2	9.5	18.7	28.2	6.1	12.0	18.1	1991
1992	16.6	21.7	38.3	9.5	18.7	28.2	5.8	12.0	17.8	1992
1993	17.1	21.7	38.8	9.5	18.7	28.2	5.8	12.0	17.8	1993
1994	17.6	21.7	39.4	9.5	18.7	28.2	5.8	12.0	17.8	1994
1995	18.2	22.4	40.5	9.5	18.7	28.2	5.8	12.0	17.8	1995
1996	18.9	23.7	42.6	10.0	19.8	29.8	8.8	15.9	24.7	1996
1997	19.7	25.1	44.8	10.0	19.8	29.8	8.8	15.9	24.7	1997
1998	20.4	26.6	47.1	10.0	19.8	29.8	8.8	15.9	24.7	1998
1999	21.3	28.2	49.5	10.0	19.8	29.8	8.8	15.9	24.7	1999
2000	22.1	29.9	52.0	10.0	19.8	29.8	8.8	15.9	24.7	2000
2001	22.3	29.9	52.3	13.8	22.0	35.7	10.2	18.8	29.0	2001
2002	22.6	29.9	52.5	13.8	22.0	35.7	10.2	18.8	29.0	2002
2003	22.8	29.9	52.7	13.8	22.0	35.7	10.2	18.8	29.0	2003
2004	23.0	29.9	52.9	13.8	22.0	35.7	10.2	18.8	29.0	2004
2005	23.2	29.9	53.2	13.8	22.0	35.7	10.2	18.8	29.0	2005
2006	23.5	29.9	53.4	13.8	22.0	35.7	10.2	18.8	29.0	2006
2007	23.7	29.9	53.6	13.8	22.0	35.7	10.2	18.8	29.0	2007
2008	23.9	29.9	53.9	13.8	22.0	35.7	10.2	18.8	29.0	2008
2009	24.2	29.9	54.1	13.8	22.0	35.7	10.2	18.8	29.0	2009

NOTES:
1. Unit costs based on projected availability.
2. Does not include costs to modify the Paducah area transmission system.
3. Assumes contract extended under current terms and conditions.
4. FY 1990 in 1990 dollars.

controls increases demand charges by an additional 3.8 mills/kWh[6] and increases energy charges by an additional 2.2 mills/kWh over the Phase I costs for the period FY 2001-2009, which is also as shown in Table 3.

OVEC could comply with the Phase I SO_2 emission target by installing scrubbers on all five units at the Kyger Creek plant and three units (half) of the Clifty Creek plant. This will reduce SO_2 emissions from 5.8-6.2 lb/mmBtu to a combined 2.0 lb/mmBtu. The installation of scrubbers for Phase I increases demand charges by 3.0 mills/kWh[7] and increases energy charges by 3.9 mills/kWh for the period FY 1996-2000, as shown in Table 3. OVEC could comply with the Phase II emission target by installing scrubbers on the remaining three units at the Clifty Creek plant. The Phase II scrubbers will reduce overall SO_2 emissions at both the Clifty Creek and Kyger Creek plants from 2.0 lb/mmBtu in Phase I to 0.6 lb/mmBtu. Installation of selective non-catalytic reduction (SNR) systems will reduce NO_x emissions from 1.5 lb/mmBtu to 0.7 lb/mmBtu. The installation of the Phase II scrubbers and the SNR systems increases demand charges by an additional 1.4 mills/kWh[8] and increases energy charges by an additional 2.9 mills/kWh over the Phase I costs for the period FY 2001-2009, which is also as shown in Table 3.

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[6]Estimated at $ 205/kW installed, 1098 MW generation capacity, recovered at 9%, 15 years.

[7]Estimated at $ 220/kW installed, 1760 MW generation capacity, recovered at 9%, 15 years.

[8]Scrubbers estimated at $ 215/kW installed, 660 MW generation capacity, SNR estimated at $22/kW installed, 2420 MW generation capacity, both recovered at 9%, 15 years.

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NONFIRM POWER COSTS/AVAILABILITIES

Nonfirm power consists of two categories, daily power available at night, primarily from base-loaded nuclear units in the sponsors' systems or neighboring systems, and unfirm power, available on a longer term basis, e.g., for several days up to several months. All nonfirm power is subject to interruption on relatively short notice.

A. Nonfirm Power for Paducah

Table 4 summarizes the nonfirm power costs at the Paducah plant, both daily and unfirm, under no acid rain and with acid rain legislation.

A.1 No Acid Rain Legislation

Daily power at 14 mills/kWh, including wheeling charges and 1 mill/kWh for EEInc., is expected to be available from a number of nuclear facilities. This rate for daily power is unchanged from the previous projection, but recent discussions with EEInc. and other utilities combined with recent experience indicate that this is still a very reasonable assumption. The 1000 MW maximum amount of daily power available is based upon the projected installed capacity of freezer/sublimers at Paducah. Freezer/sublimers are required to swing large amounts of power in a short period of time. The 33% of time represents an average availability equivalent to eight hours each night throughout the year. This daily power may also be available at a cheaper rate for a period of only six hours each night.

It must be recognized at this point that no contracts have been placed with any of the potential suppliers of low cost daily power and no arrangements made for the wheeling of such power. DOE must establish such a contractual path in order to be able to maximize the benefits obtained by the GDPs from cheap excess nuclear generation. Otherwise, the benefits of this inexpensive source of power will be shared by the utility system as a whole.

The unfirm power costs given in Table 4 for FY 1990 and FY 1991 are based on utility information and the Paducah GDP power levels in the September 24-month plan. The unfirm power costs are higher during FY 1991 due to the lack of operating flexibility and the reduced opportunity to schedule unfirm power due to the transmission system limitations. The availability of 815 MW of unfirm power through FY 1991 is based on DOE's ability to import power from the north with the current transmission system (920 MW in winter; 710 MW in summer). Upon completion of the new substation and transmission system upgrading, which will lift this restriction, the availability of unfirm power is increased to 1865-1992 MW range, resulting in a combined availability of 2500 MW of firm plus unfirm power. The availability of 2500 MW is projected to satisfy Paducah power requirements based on current demand projections.

TABLE 4

PADUCAH
NONFIRM POWER COST/AVAILABILITY (1)
(Constant 1991 Dollars)

	WITHOUT ACID RAIN LEGISLATION						WITH ACID RAIN LEGISLATION					
	DAILY (2)			UNFIRM			DAILY (2)			UNFIRM		
		Availability			Availability			Availability			Availability	
FY	$1991 mills/kWh	MW	% Time	$1991 mills/kWh	MW	% Time	$1991 mills/kWh	MW	%Time	$1991 mills/kWh	MW	% Time
1990	14.0	1000	33%	19.7	815	50%	14.0	1000	33%	20.0	815	50%
1991	14.0	1000	33%	24.3	815	93%	14.0	1000	33%	24.3	815	93%
1992	14.0	1000	33%	22.8	1865	60%	14.0	1000	33%	22.8	1865	60%
1993	14.0	1000	33%	22.8	1865	60%	14.0	1000	33%	22.8	1865	60%
1994	14.0	1000	33%	22.8	1960	60%	14.0	1000	33%	22.8	1960	60%
1995	14.0	1000	33%	23.5	1992	60%	14.0	1000	33%	23.5	1992	60%
1996	14.0	1000	33%	24.2	1992	60%	14.0	1000	33%	24.9	1992	60%
1997	14.0	1000	33%	24.9	1992	60%	14.0	1000	33%	26.4	1992	60%
1998	14.0	1000	33%	25.6	1992	60%	14.0	1000	33%	27.9	1992	60%
1999	14.0	1000	33%	26.5	1992	60%	14.0	1000	33%	29.6	1992	60%
2000	14.0	1000	33%	27.2	1992	60%	14.0	1000	33%	31.4	1992	60%
2001	14.0	1000	33%	27.2	1992	60%	14.0	1000	33%	31.4	1992	55%
2002	14.0	1000	33%	27.2	1992	60%	14.0	1000	33%	31.4	1992	55%
2003	14.0	1000	33%	27.2	1992	60%	14.0	1000	33%	31.4	1992	55%
2004	14.0	1000	33%	27.2	1992	60%	14.0	1000	33%	31.4	1992	55%
2005	14.0	1000	33%	27.2	1992	60%	14.0	1000	33%	31.4	1992	55%
2006	14.0	1000	33%	27.2	1992	60%	14.0	1000	33%	31.4	1992	55%
2007	14.0	1000	33%	27.2	1992	60%	14.0	1000	33%	31.4	1992	55%
2008	14.0	1000	33%	27.2	1992	60%	14.0	1000	33%	31.4	1992	55%
2009	14.0	1000	33%	27.2	1992	60%	14.0	1000	33%	31.4	1992	55%

Notes:

1. Nonfirm power consists of "daily" power available 8 hrs. per day and "unfirm" power available for longer periods of time. Actual usage of daily power (and to a lesser extent unfirm power) will be limited by the freezer/sublimer capacity. Nonfirm power use is also limited by the Paducah area transmission system. Costs represent estimated average cost for entire block of power. Larger/smaller blocks of nonfirm power may be available at higher/lower average cost. FY 1990 in 1990 dollars.
2. Assumes contract arrangement negotiated with nuclear utility.

Unfirm power costs given in Table 4 drop in FY 1992 to reflect the new transmission system enhancement. This increased power availability allows DOE to shift production to avoid the high summer power rates. The unfirm power costs for FY 1992 and beyond are based on the TVA/other firm energy costs (Table 2) plus 5%. This reflects the fact that the average energy cost "on the margin" for substantial quantities of unfirm power should be somewhat higher than the system energy cost (even with an availability of less than 100%) to allow for some contribution toward fixed costs and/or profit. Costs of unfirm power are expected to increase to 27.2 mills/kWh by FY 2000 to maintain the availability of unfirm power as excess generating capacity is reduced.

A.2 With Acid Rain Legislation

The source of daily power is considered to be base-loaded nuclear stations so acid rain legislation should not affect their operation. Consequently, daily power costs are shown as 14 mills/kWh under all conditions.

The unfirm power costs with acid rain legislation in Table 4 are based on the TVA/Other firm energy costs (Table 3) plus 5%. Costs of unfirm power are expected to increase to 31.4 mills/kWh by FY 2000 to maintain the availability of unfirm power as excess generating capacity is reduced. Availability of unfirm power is decreased from 60% to 55% beginning in FY 2001 on the assumption that NO_x restrictions will reduce the total power generating capacity available.

B. Nonfirm Power for Portsmouth

The nonfirm power costs for the Portsmouth plant are given in Table 5. Much of the information shown is the same as for the Paducah plant on the basis that, at this point, no major differences are known to exist among the sources for nonfirm power for these two plants.

B.1 No Acid Rain Legislation

As mentioned previously, daily power is assumed to be generated by the same or similar nuclear plants as are considered to be supplying Paducah. Consequently, daily power costs are assumed to be the same as for Paducah, namely 14 mills/kWh, and are considered to be unaffected by any future acid rain legislation. The 500 MW amount of daily power available is based upon the maximum projected installed capacity of freezer/-sublimers at Portsmouth.

The unfirm power costs for FY 1990 and FY 1991 are based on utility information and the Portsmouth GDP power levels in the September 24-month plan. Since Portsmouth's operations are not limited by the transmission system, unfirm power costs are lower in FY 1991 than for Paducah. The unfirm power costs given in Table 5 for FY 1992 and beyond are based on the TVA/other firm energy costs (Table 2) plus 5% as

TABLE 5

PORTSMOUTH
NONFIRM POWER COST/AVAILABILITY (1)
(Constant 1991 Dollars)

	WITHOUT ACID RAIN LEGISLATION						WITH ACID RAIN LEGISLATION					
	DAILY (2)			UNFIRM			DAILY (2)			UNFIRM		
		Availability			Availability			Availability			Availability	
FY	$1991 mills/kWh	MW	% Time	$1991 mills/kWh	MW	% Time	$1991 mills/kWh	MW	%Time	$1991 mills/kWh	MW	% Time
1990	14.0	500	33%	20.1	150	70%	14.0	500	33%	20.1	150	70%
1991	14.0	500	33%	22.2	1000	60%	14.0	500	33%	22.2	1000	60%
1992	14.0	500	33%	22.8	1000	60%	14.0	500	33%	22.8	1000	60%
1993	14.0	500	33%	22.8	1000	60%	14.0	500	33%	22.8	1000	60%
1994	14.0	500	33%	22.8	1000	60%	14.0	500	33%	22.8	1000	60%
1995	14.0	500	33%	23.5	1000	60%	14.0	500	33%	23.5	1000	60%
1996	14.0	500	33%	24.2	1000	60%	14.0	500	33%	24.9	1000	60%
1997	14.0	500	33%	24.9	1000	60%	14.0	500	33%	26.4	1000	60%
1998	14.0	500	33%	25.6	1000	60%	14.0	500	33%	27.9	1000	60%
1999	14.0	500	33%	26.5	1000	60%	14.0	500	33%	29.6	1000	60%
2000	14.0	500	33%	27.2	1000	60%	14.0	500	33%	31.4	1000	60%
2001	14.0	500	33%	27.2	1000	60%	14.0	500	33%	31.4	1000	55%
2002	14.0	500	33%	27.2	1000	60%	14.0	500	33%	31.4	1000	55%
2003	14.0	500	33%	27.2	1000	60%	14.0	500	33%	31.4	1000	55%
2004	14.0	500	33%	27.2	1000	60%	14.0	500	33%	31.4	1000	55%
2005	14.0	500	33%	27.2	1000	60%	14.0	500	33%	31.4	1000	55%
2006	14.0	500	33%	27.2	1000	60%	14.0	500	33%	31.4	1000	55%
2007	14.0	500	33%	27.2	1000	60%	14.0	500	33%	31.4	1000	55%
2008	14.0	500	33%	27.2	1000	60%	14.0	500	33%	31.4	1000	55%
2009	14.0	500	33%	27.2	1000	60%	14.0	500	33%	31.4	1000	55%

Notes:

1. Nonfirm power consists of "daily" power available 8 hrs. per day and "unfirm" power available for longer periods of time. Actual usage of daily power (and to a lesser extent unfirm power) will be limited by the freezer/sublimer capacity. Costs represent the estimated average cost for entire blocks of power. Larger/smaller blocks of nonfirm power may be available at higher/lower average unit costs. FY 1990 in 1990 dollars.
2. Assumes contract arrangement negotiated with nuclear utility.

assumed for Paducah. The availability of 1000 MW of unfirm power was derived from the maximum requirement for the Portsmouth plant to use unfirm power.

B.2 With Acid Rain Legislation

As at Paducah, the source of daily power is considered to be base-loaded nuclear stations and acid rain legislation should not affect their operation. Consequently, daily power costs are shown as 14 mills/kWh under all conditions.

Unfirm power costs with acid rain are shown to have the same increases as explained above for Paducah. The unfirm power costs given in Table 5 for FY 1992 and beyond are based on the TVA/other firm energy costs (Table 3) plus 5%. Costs of unfirm power are expected to increase to 31.4 mills/kWh by FY 2000 to maintain the availability of unfirm power as excess generating capacity is reduced. The availability of unfirm power is decreased from 60% to 55% in FY 2001 on the assumption that NO_x restrictions will reduce the total power generating capacity available.

SUMMARY

In order to place the GDPs in the best possible position to produce competitively priced separative work until, and probably beyond, the year 2000, DOE is implementing operational and power procurement strategies based upon the expected cost differential between firm and nonfirm types of power. Based upon the review of power costs and availabilities discussed in this report, this assumption continues to be strongly supported by the available data.

The projection of actual separative work production costs in the future is dependent not only upon power cost differentials, but also upon the "absolute" cost of power. Firm power costs are most affected by increased load growths and/or restrictions due to acid rain legislation. Therefore, to be conservative when evaluating the future cost of separative work from the GDPs, one may prefer to assume an acid rain scenario.

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APPENDIX

TECHNOLOGY OPTIONS THAT MIGHT BE CONSIDERED BY UTILITIES TO SATISFY ACID RAIN RESTRICTIONS

Without the use of control technologies, satisfying the restrictions imposed by acid rain legislation will be a problem for most electric utilities.

1. TECHNOLOGY OPTIONS

The three primary options for the control of emissions from coal-fired power plants are, typically, fuel pretreatment, modifications to the combustion process, or flue gas treatment. Some of the more viable options that can be used to reduce SO_2 and NO_x emissions are identified in this section.

1.1 SO_2 CONTROL

Passage of acid rain legislation will compel some electric utilities to install air quality control equipment at their generating plants. The majority of this retrofit equipment will be flue gas desulfurization (FGD) equipment commonly referred to as scrubbers. Scrubbers represent a class of equipment for removing dusts and mists from gases, in which a liquid (e.g., water) is added or circulated to assist in the collection process.

Several technologies can be employed for new installations or applications involving retrofitting that reduce SO_2 emissions. They are as follows:

1. pulverized coal with FGD,
2. fuel switching
3. sorbent injection, and
4. fluidized bed combustion.

1.1.1 FLUE GAS DESULFURIZATION

Flue gas desulfurization is generally divided into wet FGD and dry FGD.

Wet FGD is the process where a liquid stream containing an alkali of either lime, limestone, or sodium carbonate is contacted with the flue gas stream. In the contacting process, the flue gases are cooled to their adiabatic saturation temperature and the sulfur dioxide is captured by reacting with the alkali.

Two examples of the wet FGD system are (1) the conventional wet limestone system and (2) the open spray-tower design.

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In the conventional wet limestone FGD system, limestone is ground with a ball mill to form an additive slurry. This additive slurry is pumped to a reaction tank where it is used to remove SO_2. The reaction products are dewatered in thickeners and vacuum filters and transported to a disposal area. Wet limestone scrubbers are generally used for higher SO_2 removal requirements. The limestone additive can be supplemented with adipic acid or magnesium for very high SO_2 removal requirements.

Wet FGD processes can be designed with removal efficiencies in the 90+ percent range and, in some situations, can produce a product that can be sold. Wet FGD systems are large consumers of power, require a significant amount of land at a plant site, generally require a significant addition to manpower, and can cause a steam generator to operate at reduced load.

Dry FGD is a relatively recent addition to the technologies used for removing SO_2 from flue gas streams. The process consists of a spray dryer where a slurry of lime is contacted with the flue gas. There is not enough water added to the gas to take it to its adiabatic saturation temperature. The sulfur dioxide comes into contact with a lime slurry, forming calcium sulfate and calcium sulfite which become a dry solid as the moisture is evaporated into the flue gas. The resultant product is a dry powder that can be handled like fly ash. The dry FGD product and fly ash are collected in conventional electrostatic precipitators or fabric filters. Lime spray dryer systems are popular with installations with lower SO_2 removal requirements.

Dry FGD systems have generally been used on low-sulfur western coals with a few installations on eastern coals. Dry systems were installed in the west because the new power plants being built generally have a more severe water balance. Also, eastern plants tend to burn a higher-sulfur coal and require the efficiencies of a wet FGD.

1.1.2 FUEL SWITCHING

Fuel switching is an option that can economically reduce SO_2 emissions from an existing unit. Fuel switching is basically switching from a high-sulfur fuel to a lower one. For example, switching from a high-sulfur coal to a lower-sulfur coal or gas has the effect of reducing total SO_2 emissions.

This alternative is not as simple as it appears due to the intricate fuel design parameters of existing units. Fuel switching can often lead to reductions in unit generating capacity if the wrong fuel is purchased. Other negative impacts such as fouling, slagging, erosion, pulverizer maintenance, and electrostatic precipitator performance reductions, can result if the wrong fuel is selected.

Although fuel switching is a cost-effective means of reducing sulfur emissions, it is no cure-all. Fuel availability to match unit design characteristics, coupled with reliable delivery, should be viewed carefully with this option. Sulfur reductions with fuel switching will fall short of 90% unless the switch is from coal to gas.

1.1.3 SORBENT INJECTION

Sorbent injection is a process where an alkali, either lime, limestone, or sodium carbonate, is injected directly into the flue gas stream or furnace for reaction with the sulfur dioxide (e.g., either sodium bicarbonate or sodium sesquicarbonate is pulverized and injected dry, upstream of a particulate removal device). When the sorbent is injected into the furnace, a lime or limestone (i.e., dolomitic or high-calcium limestone) is used. Soda ash is used when injecting ahead of the particulate collector. The particulates generated are collected in the existing particulate collector along with the fly ash.

The process has many advantages and disadvantages. It is a process that can achieve moderate (40 to 60%) removal efficiencies at a relatively low capital cost. The process does not require a large amount of equipment and therefore requires less space than other processes. It does increase the particulate loading to the particulate collector. Boiler manufacturers believe there may be increased fouling and slagging with the furnace sorbent injection method.

1.1.4 FLUIDIZED BED COMBUSTION; SO_2

The fluidized bed combustion of coal is the suspension of hot granular solids by upward flowing air. Combustion occurs if the proper proportion of fuel, air, and heat are present. Sulfur is captured if sufficient alkali materials are present in the solids of the combustion zone. Generally, bed temperatures of 1500 to 1600°F are used for optimum sulfur capture.

The distinguishing characteristic of fluidized bed combustion is dictated by the velocity of air through a distributor. The two basic types of fluidized bed combustion used today are (1) the bubbling bed (low velocities of 5 to 12 ft/sec) and (2) the circulating bed (high velocities of 15 to 30 ft/sec). Actual operating tests show that SO_2 and NO_x emissions are lower in the circulating fluidized bed.

1.2 NO_x CONTROL

NO_x formation is a complex process that is primarily dependent on boiler and burner design; boiler firing practice; and to a lesser degree, coal type. NO_x control technologies can be broadly classified as combustion modification techniques or post-combustion flue gas treatment.

The most cost-effective solution to NO_x control (for gas, oil, and coal fuels) has been combustion modifications in the form of the following:

1. low excess air firing
2. overfire air or "NO_x ports"
3. low NO_x burners, and
4 "reburning" or fuel staging.

Two post-combustion modifications for NO_x control that might be considered are:

1. selective catalytic reduction.
2. selective non-catalytic reduction.

A clean-coal technology that is capable of controlling NO_x emissions (as well as SO_2) is fluidized bed combustion. Fluidized bed combustion naturally adds plant life by modifying or replacing the plant's boiler.

1.2.1 LOW EXCESS AIR

Low excess air operation reduces the overall level of oxygen available for combustion; a requirement of any low NO_x system. NO_x reductions of up to 15% and associated increases in boiler efficiency can be achieved with low excess air operation. The minimum practical excess air level, however, varies from one boiler to the next and can fluctuate with changes in fuel properties, generating load, firing configuration, and other factors. Low excess air operation thus requires a careful site-specific evaluation, including assessment of fuel and air balance within the furnace and the suitability of existing flue gas oxygen-monitoring equipment.

1.2.2 OVERFIRE AIR

Overfire air operation is a hardware modification involving the addition of air ports in the furnace wall; typically, about one burner row spacing directly above the top row of burners. Some of the combustion air, generally less than 25%, is diverted from the burner region to the ports above the burners. This causes the burners to operate fuel-rich at low NO_x levels. Applications of overfire air, now in use on over 50 coal-fired boilers to meet New Source Performance Standards (NSPS) requirements, have resulted in NO_x reductions of up to 30%.

1.2.3 LOW NO_x BURNERS

Low NO_x burners, which retard the conversion of fuel nitrogen to NO_x by delaying the mixing of fuel and air in the burner zone, have been the central element of NO_x combustion control on many NSPS boilers. Despite limited experience to date, the few commercials retrofits of these burners have demonstrated NO_x reductions of up to 50%.

1.2.4 REBURNING

The most recent NO_x control option undergoing development and approaching the demonstration stage in the United States is the concept of reburning [also known as fuel staging or in-furnace NO_x reduction (IFNR)]. The Japanese pioneered the development of this NO_x destruction concept which involves redirecting a portion of the total fuel flow (typically 10 to 20%) to the region above the top row of burners where a fuel-rich zone is

created. In the absence of sufficient oxygen to complete combustion, the surplus fuel reacts with the NO_x, causing it to be reduced. Additional air is subsequently added to complete the combustion process in a manner that does not lead to further NO_x formation.

1.2.5 SELECTIVE CATALYTIC REDUCTION PROCESS

For NO_x emission reduction, the Selective Catalytic Reduction (SCR) process has already won a dominating position in the European market. If high levels of NO_x control are required, an SCR is usually employed. While such systems are not currently required for coal-fired power plants in the U.S., they are used commercially in Japan and are now also required in West Germany where several units are currently under construction.

Dry SCR technology has dominated the marketplace due to its simplicity and reliability. It is based on treating the flue gas with ammonia (NH_3) in accordance with the following chemical reactions:

$$4NO + 4NH_3 + O_2 \rightarrow 4N_2 + 6H_2O$$

$$2NO_2 + 4NH_3 + O_2 \rightarrow 3N_2 + 6H_2O$$

A catalytic bed reactor is used to aid the chemical reactions taking place. Commercial systems are already available that can achieve greater than 90% NO_x removal.

1.2.6 SELECTIVE NON-CATALYTIC REDUCTION PROCESS

Selective non-catalytic reduction (SNR) is a low-cost, low-performance, NO_x control technology companion of selective catalytic reduction. In SNR, ammonia is injected into the flue gas to selectively convert the NO_x to molecular nitrogen and water without the aid of the catalytic bed reactors used in SCR. SNR is expected to achieve 50-60% NO_x removal.

1.2.7 FLUIDIZED BED COMBUSTION; NO_x

As stated in Section A.1.1.4, fluidized bed temperatures of 1500 to 1600°F are used for optimum sulfur capture. At this lower temperature, thermal NO_x emissions are reduced. If staged combustion is used, fuel-bound NO_x emissions can also be minimized. The combined effect of these features can reduce NO_x emissions by 60 to 80%.

QUESTIONS FROM CHAIRMAN FORD

AVLIS

Question 5: What specific financial requirements do you anticipate for each of the next five years for AVLIS? How much cumulatively will be spent on AVLIS by the November 1992 go/no go decision? How much of that total is expected to come from commercial customers? From Government customers? How much of the total will be paid for by a source of funds other than the uranium enrichment program? Who?

Answer: Projected financial requirements in the future for AVLIS are highlighted in the U-AVLIS Plan that was transmitted to Congress on January 19, 1990. Included in this plan was information which indicated the financial resources that would be required to complete technology demonstration, to build and operate a production plant and to provide technical support for a production plant. The table that shows anticipated financial requirements through FY 1998 for these purposes is found below.

Through the end of FY 1989, $829 million has been obligated in the AVLIS program. It should be noted that enrichment sales over this period have provided sufficient revenues from commercial customers to offset these obligations.

It is estimated that to complete the technology demonstration at plant scale conditions will require an additional $531 million through FY 1992. At that point, technical and

Answer 5 (continued): economic data will be available to support a decision regarding development of the AVLIS technology. Again, our projected revenues from commercial customers are expected to fully offset the expenses associated with the technology demonstrations.

The estimated funds of $531 million to complete technology demonstration by the end of FY 1992 assumes that about $25 million in costs of AVLIS facilities shared with the Special Isotope Separation (SIS) program will be provided by the Office of Defense Programs. Despite the recent decision by the Department to curtail the SIS program, Secretary Watkins has taken steps to ensure that these costs will be met by Defense Programs in both FY 1990 and FY 1991. However, in FY 1992 all of the costs of AVLIS facilities will be carried by the AVLIS program in the Office of Nuclear Energy.

PROJECTED AVLIS FINANCIAL REQUIREMENTS
(Millions of Dollars)

	Prior Years	Fiscal Year 89	90	91	92	93	94	95	96	97	98	Total FY 90-92	Total Project Cost
Development and Demonstration Program	704	126	134	155	188	79	52	31	19	16		477	1,504
Technical Support						70	70	70	67	55	55	0	387
Capital Project					54	144	243	257	218	111	6	54	1,033
Plant Operating							2	6	30	112	166	0	N/A
Total Budget	704	126	134	155	242	293	367	364	334	294	227	531	2,924

Notes:

FY89 and FY90 Actuals
Outyears in FY91 Dollars

QUESTIONS FROM CHAIRMAN FORD

AVLIS

Question 6: DOE has decided that AVLIS will be licensed by the NRC. No DOE facility is currently required to hold an NRC license in order to operate. Why this departure from policy?

Answer: The Administration has submitted legislation to Congress for the purpose of establishing a Government corporation for uranium enrichment that could potentially be privatized after 5 years. This legislation includes provisions which would require NRC licensing of an AVLIS plant since operation by a private company would require licensing. Therefore, the AVLIS plan submitted by the Secretary in January 1990 identified steps designed to obtain NRC licensing of an AVLIS plant to facilitate an effective transition of the AVLIS program to the private sector should legislation be enacted. It should be noted that the Department does not view the licensing actions identified in the AVLIS plan as a policy statement regarding NRC licensing of DOE facilities, but merely a responsible approach to a future situation involving the establishment of a Government enrichment corporation by Congress.

QUESTIONS FROM CHAIRMAN FORD

AVLIS

Question 6(a): Do you support licensing AVLIS under the nuclear reactor regulations of 10 CFR Part 50 or do you advocate some other approach? If another approach, what might that be?

Answer: Historically, 10 CFR Part 50 has been used to license nuclear reactors. A uranium enrichment plant, in terms of its operations and risk to the public and the environment, is more closely related to fuel processing plants that are currently licensed by NRC under 10 CFR Parts 40 and 70. Both the NRC and DOE have stated in testimony before Congress that 10 CFR Part 70 and Part 40 are more applicable to licensing enrichment facilities.

QUESTIONS FROM CHAIRMAN FORD

AVLIS

Question 7: Lawrence Livermore National Laboratory has played a very important role in the development of the U-AVLIS technology. Should they continue to play such a controlling role -- or should we be bringing on outside business expertise to get U-AVLIS to commercialization?

Answer: The Department is making every effort to utilize outside business expertise in order to effectively transition the U-AVLIS technology to commercial application. This commitment was highlighted in the plan for the demonstration and deployment of the U-AVLIS technology that was submitted by Secretary Watkins to Congress on January 19, 1990. A major thrust of that plan involved a significant increase in industrial involvement for technology transfer and transition to production. Through a competitive selection process, a commercial deployment contractor will be selected who can bring additional industrial experience to the U-AVLIS program. The primary purpose of this commercial contractor will be to take the technology from the laboratory to production. An important requirement in any transfer of U-AVLIS program responsibilities to a commercial contractor is that it will occur when, and only when, the contractor has demonstrated that he has a sufficient technical capability,

Answer 7 (continued): the necessary resource commitment, and an acceptance of accountability for technology performance. Our objective is to affect this transfer as soon as possible.

Question 8: DOE published a "Notice of Proposed Rulemaking" in the Federal Register on April 23, 1990 in order to begin its industrial access program. What is the purpose of the industrial access program?

Answer: The purpose of the industrial access program is broadly based. It is basically designed to: (1) foster and increase the vendor base of special equipment needs of the U-AVLIS program, (2) assist in the transfer of DOE developed uranium processing technology to the uranium processing industry, and (3) begin the process of transferring all aspects of the U-AVLIS technology to qualified industrial concerns. The transfer of U-AVLIS technology to industrial entities is an essential step in ensuring that the transition of U-AVLIS technology to commercial application is efficiently and effectively accomplished.

QUESTIONS FROM CHAIRMAN FORD

AVLIS

Question 8(a): When do you expect that the program will begin?

Answer: A public hearing is scheduled for May 22, 1990. At that time, the Department will begin to receive comments on the proposed rulemaking for industrial access to the U-AVLIS program. It is anticipated that after a review of all comments, the final rule on the industrial access program will be published in early summer. A Request for Proposals will be issued after the final rule is published. Proposals will be reviewed and contract negotiations should begin in late summer.

Initiation of the program will depend on the number of proposals to be processed. Our current expectations are that the program will start in a phased approach beginning on an unclassified basis in the fall. It is estimated that as much as 80 percent of the technology can be discussed in unclassified, but controlled access meetings. Access to data on this basis is felt to be sufficient to provide the data base necessary for industrial firms to understand the U-AVLIS technology to the level of detail needed to provide constructive input to the program. It is also expected that this understanding will be sufficiently comprehensive for industrial firms to be able to develop highly responsive

Answer 8(a) (continued): proposals during the selection of a Commercial Deployment Contractor, if they wish to do so.

Full access to classified portions of the U-AVLIS technology could require 9 months from the initiation of the access program to allow for the processing of clearances. However, a substantial number of industrial firms already have personnel with clearances and we would expect them to utilize these personnel in the U-AVLIS industrial access program. This would then facilitate the timing for firms to generate a complete understanding of the entire U-AVLIS technology program. We fully expect the majority of firms that participate in the industrial access program will have personnel with existing clearances and the level of understanding by these industrial firms in the U-AVLIS program will be quite high within a very short time period.

QUESTIONS FROM CHAIRMAN FORD

AVLIS

Question 8(b): How many months after the program begins will an industrial contractor to carry out AVLIS demonstration be chosen?

Answer: Our target date for the selection of the commercial deployment contractor is March 1991. This is approximately 7 months after the industrial access program begins.

Many high technology industrial firms have extensive expertise that can be applied to the task of transitioning a promising technology to commercial use. These firms usually need only to be cognizant of the basic aspects of a particular technology in order to determine how to effectively apply their resources to technology deployment. Therefore, the timing from the initiation of an access program to selection of an industrial contractor is felt to be aggressive, but of sufficient length to allow industrial firms to be able to determine how best to contribute to the deployment of U-AVLIS technology.

QUESTIONS FROM CHAIRMAN FORD

AVLIS

Question 8(c): Will that contractor be the ultimate builder and operator of the AVLIS production plant should it be built?

Answer: Yes, the industrial contractor that is selected will be the builder and operator of the U-AVLIS production plant should it be built by the Government. There is always the possibility that the Administration could decide to turn the technology over to the private sector.

QUESTIONS FROM CHAIRMAN FORD

AVLIS

Question 8(d): What is the incentive for the "losers" to continue to provide technical and business advice to the Department?

Answer: The Department believes that there will continue to be incentives for participation in the industrial program after the selection of the commercial deployment contractor. In particular, participation will enhance the ability of commercial vendors to supply special equipment for the U-AVLIS program and to support the commercial deployment contractor. Participation will allow firms to assess how they can apply their resources to the Department and the deployment contractor during the design, construction, and operational phases. This work is expected to be broad and varied with opportunities for many commercial firms. In addition, the incentive for firms to assist in the transfer of uranium processing technology to the uranium processing industry will still remain. Finally, industrial firms will be able to evaluate potential applications of the U-AVLIS technology for other possible commercial applications. All of these incentives will exist regardless of who is chosen to be the commercial deployment contractor.

Answer 8(d) (continued): In addition should the Administration decide to turn over future development and construction of U-AVLIS to the private sector, all interested companies would have a chance to license any patents for commercial purposes.

QUESTIONS FROM CHAIRMAN FORD

AVLIS

Question 9: I am concerned that AVLIS will become the "GCEP of the 1990's." What specific steps is DOE taking to avoid this from becoming a reality?

Answer: In order to assure that AVLIS does not become the "GCEP of the 1990s," the Department intends to apply a disciplined approach consistent with principles used in the private sector. This approach involves identifying a design with proven technical and economic performance, minimizing capital investment of a deployment venture, and involving industrial knowledge and expertise in the process of deployment. These types of actions are highlighted in the AVLIS plan that was submitted to Congress on January 19, 1990.

Specifically, the Department will deploy the AVLIS technology only when the technical and economic performance is demonstrated at plant-scale conditions. A technology demonstration will be completed by September 1992, at which time the demonstration results will be thoroughly evaluated. A determination whether to proceed with deployment of the AVLIS technology will be made in November 1992. Steps will also be taken to assure that deployment is warranted and consistent with market needs. In addition to internal market assessments, the Department plans to seek the advice and

Answer 9 (continued): input of a senior industrial review group with extensive experience in the industrial sector, the nuclear industry, and in high technology programs. At all times, the business, financial and commercial principles associated with deployment decisions in the private sector will be utilized and applied in the AVLIS program.

Question 10: In response to questions following your confirmation hearing, you indicated that draft criteria for site selection would be available by the spring of 1990. When do you anticipate that these criteria will be available?

Answer: An Advanced Notice of Intent announcing the Department's intent to prepare an environmental impact statement for the Uranium-AVLIS program is expected to be issued in mid-June 1990. The Advanced Notice, which will be available for public review and comment, will contain the draft criteria for site selection.

QUESTIONS FROM CHAIRMAN FORD

AVLIS

Question 11: Do cost estimates for AVLIS take into account costs resulting from a change from UF6 to a uranium metal economy?

Answer: Current cost estimates for U-AVLIS of $25 to $50 per separative work unit (SWU) take into account costs resulting from a change from UF6 to a uranium metal economy. In fact, we currently project that significant cost savings could be realized by switching to a metal economy. By going directly from uranium ore to uranium metal for feed and going directly from metal to uranium oxide for product avoids unnecessary conversion to UF6. This reduces the number of chemical conversion steps and produces significantly less waste to be treated. Our current estimate of the savings is in the neighborhood of $10 to $15 per SWU.

Our plan is to utilize the existing uranium processing industry wherever possible. In 1990, we initiated a joint development and demonstration program with the domestic fuel fabricators to ensure U-AVLIS product acceptability with the existing industry. In FY 1991, a similar program will begin with the uranium feed conversion processors. This policy has the advantage of minimizing our investment while at the same time preserving the health and assisting the transition of the existing industry from a UF6-based to metal-based

Answer 11 (continued): economy. Full transition to a metal economy will take 10 to 20 years. This timeframe should permit an orderly transfer from a UF6 to a uranium metal base economy without negative impacts to the industry.

Trade Issues - USSR

Question 12(a): What volume of sales did DOE lose to the Soviets in 1989?

Answer: Enrichment sales opportunities of about 0.5 million separative work units (SWU) in 1989 were captured by supply sources other than DOE. Most of these sales were provided by brokers or traders and not from primary suppliers. However, we understand that the majority of these sales transactions were made based upon the availability of Soviet SWUs.

QUESTIONS FROM CHAIRMAN FORD

Trade Issues - USSR

Question 12(b): What is the cumulative sales loss to the Soviets since 1986?

Answer: From 1986 through 1989, sales of about 1.7 million separative work units in the United States have been provided by suppliers other than DOE. Though most of these sales have been transacted through brokers or traders, press reports indicate that a significant portion was provided by the supply of enrichment from the Soviets.

Question 12(c): What are your expectations for 1990?

Answer: In 1990, about 700,000 separative work units (SWU) in enrichment sales opportunities are available. We expect that most, if not all, of these sales will be captured by short-term contracts at very low prices. The Soviets have reportedly offered enrichment in the United States at about $55 per SWU, or about half of the price available from DOE or the other primary suppliers. If the Soviets continue to make sales offers at these prices, it is expected that they will capture the majority of the sales opportunities that currently exist in 1990.

QUESTIONS FROM CHAIRMAN FORD

Trade Issues - USSR

Question 13(a): The Soviets currently export 3 million SWU, but have indicated publicly that they would increase the supply if market conditions are favorable.

How much excess capacity do you believe exists?

Answer: The Soviets have stated publicly that they are prepared to make available as much as 5 million separative work units (SWU) annually for export. The industry press has suggested that Soviet excess capacity may be as high as 9 million SWU per year.

Question 13(b): Given the decline of the Soviet nuclear program, their reduced military requirements and their desire for hard currency -- isn't it likely that SWU exports from the Soviets will increase?

Answer: The Soviets have publicly stated that they want to increase their share of the world enrichment market, including the market in the U.S. for the purposes of generating hard currency to support the revitalization of their economy. Sales of Soviet enrichment have recently been reported at about $55 per SWU, or about half of the price available for DOE and the other primary suppliers. If the Soviets continue these pricing practices, it is expected that their SWU exports will increase.

QUESTIONS FROM CHAIRMAN FORD

Trade Issues - USSR

Question 13(c): What effect will increased Soviet exports have on the DOE program? What percentage of the western world market for nuclear fuel do you expect the Soviets to hold for each year through 2000?

Answer: Increased Soviet exports of enrichment would likely have a direct affect on DOE. The two European enrichment suppliers, Eurodif and Urenco, supply the majority of their enrichment to either equity partners or customers in their home countries that have a strong preference for an indigenous source of supply. None of DOE's customers are equity holders and the majority of customers consider price to be the predominant factor of making future purchase decisions. Therefore, the availability of Soviet enrichment, especially at very low prices, could result in sales losses for DOE.

The Soviets currently supply about 5 percent of the western world market for enrichment. The percentage of the western world market for nuclear fuel that the Soviets will supply through the Year 2000 is highly dependent on their sales practices and prices, which at this time are very difficult to ascertain. However, any increase in market share will likely represent a market share loss for DOE. Such a result would jeopardize DOE's ability to recover costs and provide a return to the taxpayer.

QUESTIONS FROM CHAIRMAN FORD

Trade Issues - USSR

Question 14: At what prices are Soviet SWUs now being sold? How do they compare to the DOE price? What might account for the large discrepancy in price?

Answer: To the best of our knowledge, Soviet SWUs are presently being sold for as low as $55 per Separative Work Unit (SWU), about 50 below the prices available from the Department of Energy or other major world suppliers. We cannot conclusively determine what accounts for this large discrepancy in price because of the difficulty in comparing market-based and state controlled economies. This difficulty is compounded by the lack of detailed cost data on the Soviet production process.

QUESTIONS FROM CHAIRMAN FORD

Trade Issues - USSR

Question 15(a): Mr. Young, there has been some concern that Soviet SWUs are being sold at prices that do not reflect the real production costs. In other words, they are being "dumped" into the market.

Has DOE analyzed this situation?

Answer: DOE frequently monitors sales of enriched uranium to the world marketplace in order to analyze the current and future competitive situation. A thorough analysis that includes the most recent market sales, including those being made by the Soviets, has not yet been completed. However, when completed, this analysis will contain information that is classified, propriety, or commercially sensitive.

In view of these concerns, I would prefer and be pleased to provide a briefing for you in an executive session regarding the content of DOE's analysis after it has been completed.

QUESTIONS FROM CHAIRMAN FORD

Trade Issues - USSR

Question 15(b): Has DOE considered action under U.S. trade laws or any other action to resolve this problem?

Answer: The Department is presently considering a variety of possible options to resolve the problem, several of which include actions under U.S. trade laws. An encouraging note is that the Soviets have expressed a willingness to work with us to resolve the problem in a mutually acceptable way, a way that will not adversely affect the Department's interests. No decision has yet been made among the possible options. We will inform you as soon as we decide on a course of action.

QUESTIONS FROM CHAIRMAN FORD

DOE Budget Request and General Market Statistics

Question 16(a): In the FY 1991 budget request, DOE requested authority to buy enrichment services and enriched uranium in the spot market. This will, in effect, make DOE a broker. The language of the request does not limit either the quantity or the source of potential DOE purchases.

How much enrichment services or enriched uranium does DOE anticipate purchasing in this manner?

Answer: DOE has made no firm plans to purchase enrichment services under the proposed language in the FY 1991 budget request at this time. The language was requested to permit DOE with the option of purchasing enriched uranium, if the opportunity arises, to purchase small amounts that can be purchased at prices below DOEs marginal cost of production. The maximum amount that we envision could be purchased on an economically attractive basis that helps reduce DOE's cost of production varies from 1 to 2 million separative work units.

Question 16(b): What is DOEs marginal cost of production at various production levels, such as 10, 12, and 14 million SWU?

Answer: Information on DOEs marginal cost of production is potentially valuable to our competitors and, therefore, DOE would prefer to provide this information to you on a more confidential basis. Therefore, I would be pleased to provide a briefing for you or your staff regarding DOEs marginal cost of production.

QUESTIONS FROM CHAIRMAN FORD

DOE Budget Request and General Market Statistics

Question 16(c): How much enriched material is available annually at a price lower than DOEs marginal production costs?

Answer: Though enrichment services are currently being offered on the spot market at about $55 per SWU, the total quantity of material that is available at a price that is less than DOEs current marginal cost of production is unknown. In any event, DOE does not anticipate that large quantities of separative work will be available at prices that would make their purchase economically attractive when compared to DOEs marginal cost.

Question 16(d): Is the amount available at prices lower than DOEs production costs enough to affect the need to operate any of the DOE facilities?

Answer: DOE would only consider purchases of small quantities of enrichment services if the price for these purchases were below our marginal cost of production. The quantities that are available and that meet this criteria do not approach the quantities necessary to even consider closing one of DOE's plants.

QUESTIONS FROM CHAIRMAN FORD

DOE Budget Request and General Market Statistics

Question 16(e): **Does DOE anticipate purchasing enriched uranium from the Soviet Union? Or would DOE consider purchasing only enrichment services from the Soviet Union? How does DOE guard against inventory loans where DOE may buy from a utility or producer inventory only to have that inventory replaced by Soviet uranium?**

Answer: DOE is currently evaluating a range of alternatives to allow the uranium enrichment enterprise to compete effectively in a free market environment. These alternatives include the question of how best to address the import of Soviet enriched uranium. No conclusions have yet been reached. We will keep the Committee informed of any action the Department may propose to take on this matter.

Question 16(f): **If DOE buys enriched uranium, will this affect the DOE SWU price?**

Answer: DOE would purchase enrichment services only if the price is less than the DOE marginal cost of production. The resulting cost savings could then be passed on to our customers in the form of lower prices.

QUESTIONS FROM CHAIRMAN FORD

DOE Budget Request and General Market Statistics

Question 17: What is the projected total U.S. demand for SWU in 1996-2000?

Answer: The total projected U.S. SWU demand for the period FY 1996 through FY 2000 is about 43 million SWU.

Question 18: What percentage of that demand is represented by current DOE customers? In other words, if all current DOE customers were planning to purchase 100% of their requirements from DOE between 1996 and 2000, how much of U.S. demand would that represent?

Answer: If all current DOE customers purchase 100 percent of their requirement from DOE between 1996 and 2000, this amount would represent about 92 percent of the total U.S. demand.

QUESTIONS FROM CHAIRMAN FORD

DOE Budget Request and General Market Statistics

Question 19: DOE has experienced terminations for all or part of customer requirements. Please provide the Committee with an update on recent terminations from FY 1996 through 2000. How many utilities have terminated? How many SWU does that represent? Who are the utilities that have terminated?

Answer: The Department has received termination notices from 24 utilities for either part or all of their enrichment requirements during the FY 1996 thru FY 2000 time period. The total amount of those terminations is 12 million SWU with a sales value of about $1.2 billion. A listing of the utilities who have terminated their DOE contracts in full or part is shown below:*

*The Department of Energy deemed this list to be "Government Confidential Commercial Information" and is not included herein.

Question 19(a): Of the amount available for commitment, how much of the market has DOE captured?

Answer: DOE has captured approximately 46 percent of the total Utility Services Contract customer requirements for FY 1996 through FY 2000.

QUESTIONS FROM CHAIRMAN FORD

DOE Budget Request and General Market Statistics

Question 19(b): Why have they terminated?

Answer: Customer reasons for terminating their post-1995 contract commitments with DOE include a belief that the market will become more competitive with lower prices potentially being available from other enrichment suppliers, including the Soviet Union. Customers have a feeling of uncertainty regarding whether DOE will be able to keep its operating costs down and remain competitive in the post-1995 market. In addition, with the continued oversupply in the enrichment market, the emergence of the Soviet Union as a major market sector and possibly a commercial Urenco plant in the United States, customers are highly confident that adequate enrichment supply is available. Therefore, many customers are either considering or taking steps to reduce the length of their contract commitments to less than 10 years.

QUESTIONS FROM CHAIRMAN FORD

DOE Budget Request and General Market Statistics

Question 19(c): What actions is DOE taking to prevent future terminations?

Answer: DOE is aggressively pursuing cost control measures at the gaseous diffusion plants including maximizing the use of inexpensive, off-peak and non-firm power, in order to ensure that prices can be provided at competitive levels. We are also committed to completion of the AVLIS technology demonstration to assure that the lowest cost enrichment supply can be made available as quickly as possible. The most comprehensive and long term solution to ensure that the enrichment enterprise is competitive involves the establishment of a commercially oriented Government enrichment corporation. The Administration continues to support restructuring legislation that will accomplish this. Every effort is being made to encourage the House to take action and follow suit with the Senate in order to enact this legislation.

QUESTIONS FROM CHAIRMAN FORD

DOE Budget Request and General Market Statistics

Question 20: What is that status of foreign customers -- have any terminated?

Answer: DOE has received a partial contract termination from one foreign utility customer for FYs 1996 through 1999, one full termination in FY 1999 and full terminations from two additional utilities for FY 2000. It is our understanding that these customers have not yet selected another supplier for enrichment, but have left their options open for future consideration. The sales value of these terminations that also represent future sales opportunities is about $60 million.

QUESTIONS FROM CHAIRMAN FORD

DOE Budget Request and General Market Statistics

Question 21: DOE did not ask its customers to make commitments for 2000. Why? Didn't some customers elect to terminate even though DOE waived the April 1 requirement? What percentage of domestic demand does this represent? Who are they?

Answer: DOE waived the requirement for its customers to make commitments for FY 2000 this past April because we understand that it was extremely difficult for our customers to make long-term procurement decisions, either to commit or to terminate, at the present time. Customer reaction to this waiver was very favorable. However, even though the notice requirement was waived, several customers elected to terminate their requirements for FY 2000. The estimated SWU quantity terminated by these customers represents 17 percent of domestic demand. DOE does not disclose the details of contracts with individual utilities to protect the customers' and DOE's sensitive business data.

QUESTIONS FROM CHAIRMAN FORD

DOE Budget Request and General Market Statistics

Question 22: Is price the only factor determining uranium enrichment purchases by DOE customers today? What other factors play a role in determining a utility's choice of supplier?

Answer: Price is the predominant factor customers use in determining their source of enrichment supply. Other factors including supply assurance, contract length and contract flexibilities are considered but they are much less important in determining a utility's choice of enrichment supplier.

QUESTIONS FROM CHAIRMAN FORD

D&D and Environmental Compliance

Question 23: GAO, in a recent report, estimated that total decommissioning and environmental costs for the enrichment program could total $6 billion. Do you agree with their cost analysis? If not, why not?

Answer: The reference that was made by GAO to a total cost of $6 billion for both decontamination and decommissioning (D&D) and environmental work at the Department's enrichment plants is approximately correct. DOE's current estimate for D&D activities at all three enrichment plants is about $3 billion. The majority of these costs are not expected to be incurred until sometime after 2005.

DOE has also estimated its future environmental costs through the year 2010 to be about $2.7 billion. Of the total costs, $1.7 billion are related to ongoing operations and the remaining $1.0 billion are related to remedial and corrective costs at Portsmouth and Paducah, costs to maintain the Oak Ridge facilities that have been shut down in a safe condition prior to final decommissioning and the cost for remedial action at Oak Ridge.

Therefore, DOE's estimate of the total environmental cost of $2.7 billion plus the $3 billion estimate for D&D represents a total of nearly $6 billion. This total figure for

Answer 23 (continued): environmental and D&D cost is close to the $6 billion figure referenced by GAO.

The primary disagreement with GAO involves the implication, which is not accurate, that these costs have not been reported in financial statements and steps are not being taken by DOE to recover the environmental costs that are projected.

Question 24: GAO, in that July 1989 report, implies that the total D&D and Environmental costs are not being recovered. Is that true?

Answer: Contrary to GAO's claim, DOE has been and will be recovering all environmental costs at its enrichment facilities in its prices for enrichment services. The $1.7 billion in estimated environmental costs for ongoing operations, the $1.0 billion relating to remedial and corrective costs for all three sites and the costs to maintain Oak Ridge in a safe condition prior to final D&D will be recognized and recovered through enrichment prices as they are actually incurred or expended. Beginning in FY 1991 DOE will also recover the $3 billion in estimated D&D costs by including $50 million in annual prices to commercial customers.

QUESTIONS FROM CHAIRMAN FORD

D&D and Environmental Compliance

Question 24(a): Is it misleading to conclude that DOE has a $6 billion liability that is not being addressed?

Answer: It is misleading to conclude that DOE has a $6 billion liability that is not being addressed. DOE has recognized and recovered environmental costs and D&D in FY 1988, FY 1989, and FY 1990 through its enrichment prices and DOE will recover all future environmental and D&D costs through future enrichment prices.

Question 25: How much is the cost for environmental compliance at the shut down Oak Ridge Gaseous Diffusion Plant? Who is paying that amount? Through SWU charges?

Answer: The cost to maintain the Oak Ridge facilities that have been shut down in a safe condition prior to final decommissioning and the cost for remedial action is estimated to be $434 million. DOE is recovering all environmental costs at its enrichment facilities in its prices to enrichment customers. Approximately half of these costs will be recovered from Government customers, including the military.

QUESTIONS FROM CHAIRMAN FORD

D&D and Environmental Compliance

Question 26: I understand that DOE currently has the authority to collect environmental compliance costs in its pricing base? What amount is being collected from commercial and Government customers in FY 1990? Projected to be collected from customers in FY 1991?

Answer: DOE has recognized and recovered environmental compliance costs in FY 1988, FY 1989, and FY 1990 through its enrichment prices. Environmental compliance costs include environmental restoration, corrective actions, and waste management.

The FY 1990 and FY 1991 enrichment budget includes all costs for these categories at Paducah and Portsmouth plants and the commercial share of these costs at the shutdown Oak Ridge plant. These costs are allocated in prices to commercial and Government customers based on historical deliveries. The resulting amounts shown below are included in prices and recovered annually.

($ in Millions)

	FY 1990		FY 1991	
	Government	Commercial	Government	Commercial
Environmental Restoration	$12.3	$39.7	$16.4	$ 52.9
Corrective Actions	4.1	3.0	5.3	4.0
Waste Management	6.8	5.5	6.3	5.1
Total	$23.2	$48.2	$28.0	$62.0

Answer 26 (continued): The Government share of the costs for the shutdown Oak Ridge plant are not shown but are included in the Office of Environmental Restoration and Waste Management budget.

Question 27: Does DOE have the authority to collect for D&D in its SWU charge?

Answer: DOE has the authority to collect for D&D in its SWU charge and will be recovering $1.4 billion for the commercial share of D&D. However, even though DOE can collect funds for future D&D liabilities, DOE does not currently have the authority to retain these funds so that they will be available when the work is actually performed. Legislation is required to provide DOE the authority and necessary mechanisms to retain funds in order to retire these future liabilities. In the FY 1991 budget submission, the Administration proposed language as part of legislation to create a Government enrichment corporation which would allow DOE to retain funds to liquidate the liabilities associated with the D&D of the enrichment facilities. In the event this legislation is not enacted, DOE has proposed that Congress approve the establishment of a D&D Fund in the U.S. Treasury as a responsible and prudent means of addressing this future environmental liability.

QUESTIONS FROM CHAIRMAN FORD

D&D and Environmental Compliance

Quest 3(a): How much does DOE estimate that D&D of the three enrichment plants will cost?

Answer: The Department's current estimate of the total cost to decontaminate and decommission its uranium enrichment facilities is about $3.0 billion. Commercial customers would pay about 50 percent of these costs based on their historical use of enrichment from these facilities.

QUESTIONS FROM CHAIRMAN FORD

D&D and Environmental Compliance

Question 28(b): What basis does the Department have for making this estimate given that no D&D project for plants like these has ever been undertaken?

Answer: This estimate is based upon an initial evaluation of the costs necessary to decontaminate and decommission the enrichment facilities and prepare them for possible future use. The best possible judgement was applied to the removal, safe storage and disposal of both nonradioactive plant equipment and equipment that has been exposed to or contains either low or high assay uranium. In addition, the cost of disposal of hazardous wastes, including transuranic wastes, has been projected based upon technology and processes available today. No cost benefit was assumed for possible future technological advances that could be applied in order to more efficiently D&D the enrichment facilities.

Question 28(c): When are these costs likely to be incurred?

Answer: The majority of these costs are expected to be incurred sometime after the year 2005.

QUESTIONS FROM CHAIRMAN FORD

D&D and Environmental Compliance

Question 29: Have any outside estimates of the cost of D&D ever been undertaken? If so, by whom? What are the results?

Answer: No outside estimates of the cost of D&D for the Department's enrichment facilities have been made to date. The Smith Barney report, released on May 15, 1990, concluded that all existing estimates are not adequately comprehensive and they recommend that a more detailed study of the cost of D&D be undertaken. The Department is evaluating this recommendation.

QUESTIONS FROM CHAIRMAN FORD

D&D and Environmental Compliance

Question 30: How much does DOE anticipate that the D&D and safe storage of shut down facilities will cost between now and 2010? What facilities are included in this estimate? Are these costs being recovered through the SWU charge? How much per year in FY 1990? FY 1991?

Answer: DOE's current estimate for D&D activities at all three enrichment plants is about $3 billion. The majority of these costs are not expected to be incurred until sometime after 2005. The Oak Ridge Gaseous Diffusion Plant is the only enrichment facility that is currently shut down and the commercial share of keeping the Oak Ridge Gaseous Diffusion Plant in safe storage is estimated to be $192.2 million through 2010.

The Department includes the commercial share of the costs of keeping the Oak Ridge site in safe storage in annual SWU changes. In FY 1990 and FY 1991, $17 million and $36 million respectively in costs will be incurred and recovered in commercial prices. Beginning in FY 1991 SWU charges will also recover $50 million each year to cover the commercial share of future D&D activities for all three sites.

QUESTIONS FROM CHAIRMAN FORD

D&D and Environmental Compliance

Question 31: DOE has documented water pollution in the area. Please provide a summary of the extent of the contamination.

Answer: In August 1988, offsite ground water contamination was discovered in residential wells near the Paducah GDP. The contamination is approximately three-fourths of a mile offsite to the north/northeast of the plant. Residents with contaminated wells were immediately supplied an alternate water supply. The groundwater contaminants are Trichloroethylene (TCE) and technetium (Tc). The maximum TCE concentrations detected in the offsite wells was 839 ppb which is 160 times higher than the Federal standard. The concentration of Tc which was detected in those offsite wells was 500 pico curies/liter, which is 10 times higher than the Federal standard.

QUESTIONS FROM CHAIRMAN FORD

D&D and Environmental Compliance

Question 31(a): What has been found? Where? Does it pose any threat at all to the residence of the area?

Answer: In August 1988, residential wells offsite, but near the Paducah gaseous diffusion plant, were found to be contaminated with Trichloroethylene (TCE) and technetium (Tc). Residents with contaminated wells were immediately supplied an alternate water supply to avoid any potential health threat. The maximum TCE concentration detected in the off-site wells was 839 ppb which is 160 times higher than the Federal standard. The maximum Tc concentration detected was 500 picocuries/liter which is 10 times higher than the Federal standard. Medical examinations of the affected residents did not identify any adverse affects as a result of the groundwater contamination. As a followup, these residents will be retested every 12 months.

QUESTIONS FROM CHAIRMAN FORD

D&D and Environmental Compliance

Question 31(b): What specific action is DOE taking to remedy the situation? When? How long will it take to solve this problem?

Answer: On November 23, 1988, DOE and the Environmental Protection Agency (EPA) signed a Consent Order where DOE agreed to investigate the extent of the contamination and determine what corrective measures, if any, were required to protect the public health and the environment. A work plan was prepared, submitted to EPA, and approved by EPA in April, 1989. Field investigations began in May, 1989 and are expected to take one to two years in order to complete a thorough characterization of groundwater contamination. Upon completion of this characterization, a determination will be made as to what corrective measures are required at the Paducah site.

QUESTIONS FROM CHAIRMAN FORD

D&D and Environmental Compliance

Question 32(a): I understand that a DOE Tiger Team recently completed its investigation into environmental, safety and health matters at the Portsmouth GDP. According to a DOE memorandum, the Tiger Team found:

"While, in our judgment, no imminent hazard exists to workers in those facilities, the lack of adherence to fundamental safety standards, as well as a work environment largely lacking in formality, discipline, and accountability to safety, presents an unacceptable situation."

What specific action is DOE taking to remedy this "unacceptable situation?"

Answer: In response to the Tiger Team, an action plan has been developed to respond to the Tiger Team findings. The centerpiece of this action plan is the implementation of a Performance Improvement Program that will integrate discipline, formality and accountability to safety into the procedures used at the plant. This will be done through the systematic development of performance objectives and criteria for each functional area based upon standards that are currently being applied by the Institute of Nuclear Power Operations.

QUESTIONS FROM CHAIRMAN FORD

D&D and Environmental Compliance

Question 32(b): Will there be a similar analysis for the Paducah GDP? Why or why not?

Answer: Yes, there will be a similar analysis of the Paducah GDP. A Tiger Team is scheduled to conduct an appraisal of the Paducah GDP beginning on June 18, 1990.

QUESTIONS FROM CHAIRMAN FORD

D&D and Environmental Compliance

Question 33(a): A recent article in Inside Energy states that Chairman Dingell has asked DOE to complete 1983 tests on possible UF6 contamination in the air outside the Portsmouth GDP. Chairman Dingell wrote:

> "Apparently, no one at the DOE wanted to know what the samples might reveal because the DOE directed the samples be kept on ice."

What were these 1983 tests about? Why were they not completed? Will you be completing them? When?

Answer: The 1983 tests were environmental samples collected July 12, 1983, that were analyzed to help resolve an unexplained accumulated 1981-1982 uranium inventory difference at the Portsmouth Gaseous Diffusion Plant.

The analysis of additional environmental samples was not performed because it was believed that the results would not change the safeguards and environmental conclusions. Basically, it was concluded that theft or diversion of material associated with the uranium inventory differences had not occurred, and that there were no environmental concerns even if the entire 1981-1984 accumulated inventory difference (217 kg of U-235) was released to the environment.

Answer 33(a) (continued): DOE recently reassessed the previous decision to not analyze the remaining samples and reaffirmed that the basis for the previous decision remains valid. Despite this finding and in response to Congressman Dingell's request, DOE has directed that the preserved samples be analyzed in order to ensure the most exhaustive review possible of the issue. These results are anticipated to be available in September 1990.

QUESTIONS FROM CHAIRMAN JOHNSTON

AVLIS

Question 1: How can we know the cost of AVLIS enrichment services with any accuracy when --
first, we do not know what environmental and safety constraints will be placed on the technology in the licensing process;
second, we don't know what nuclear proliferation constraints will apply; and
third, the present design of any AVLIS plant may have to be substantially changed to meet licensing concern?

Answer: The Department has conducted and periodically updates assessments of health, safety, environmental, safeguards, nuclear nonproliferation and licensing requirements as they relate to a potential U-AVLIS plant. These assessments include the most recent regulatory orders and standards and serve as a basis for identifying cost projections for U-AVLIS plant design requirements. Many of the regulatory requirements as well as required plant design features are common to other nuclear fuel processes that use uranium bearing materials such as commercial uranium conversion and uranium fuel fabrication facilities. Although the Nuclear Regulatory Commission has never licensed an enrichment plant, they have licensed uranium conversion and fuel fabrication facilities where similar safety, environmental and safeguards requirements are applied. Therefore, the environmental, safety, nuclear non proliferation and licensing constraints

Answer 1 (continued): have been evaluated and the current cost projections for U-AVLIS include a careful consideration of these constraints.

Question 2: How have you factored these uncertainties into your AVLIS cost estimates?

Answer: Cost estimates for a U-AVLIS plant have included the results from assessments of environmental, safety, nuclear nonproliferation, and licensing requirements. Cost experience from existing operational facilities, including enrichment, uranium conversion and uranium fuel fabrication plants, that is relevant to U-AVLIS plant operations has been incorporated in these assessments and U-AVLIS cost estimates. Also, a contingency factor has been applied to U-AVLIS hardware and design costs to account for uncertainties in future costs as they relate to environmental, safety, nuclear nonproliferation and licensing. The Department will continue to evaluate these areas from now through the conclusion of the U-AVLIS technology demonstration program in 1992 in order to generate a detailed conceptual design of a U-AVLIS plant with cost estimates at a high confidence level.

QUESTIONS FROM CHAIRMAN JOHNSTON

AVLIS

Question 3: Today there are large excess inventories being worked off. Could AVLIS compete with the distress sales of these inventories? How does your analysis of AVLIS competitiveness deal with these inventories?

Answer: Excess inventories are typically sold at spot market prices which are currently about $50 to $60 per SWU for enrichment. Many of the parties that now possess excess enrichment inventories are unwilling to sell at these low prices.

U-AVLIS production costs are estimated to be $25 to $50 per SWU, which is very competitive as compared with any other primary enrichment process and also with the current distress sales prices of excess enrichment inventories. However, we expect that existing excess inventories of enriched uranium will be sold before 1997 when a U-AVLIS plant is expected to operate. Therefore, the sale of excess inventories should not even be a competitive factor for a U-AVLIS plant.

QUESTIONS FROM CHAIRMAN JOHNSTON

AVLIS

Question 4: Today there is a large amount of excess capacity in the world. Much of this excess capacity can be brought on line at low marginal cost. Could AVLIS compete with this low marginal cost? How is this included in your analysis of AVLIS competitiveness?

Answer: Our current projection is that U-AVLIS can provide enrichment at $25 to $50 per SWU. This is considered to be very competitive even when compared to marginal costs of production from enrichment suppliers who have excess capacity.

Question 5: The first AVLIS plant will produce enriched uranium at higher cost than later, larger plants that can make use of the economies of scale. How has this effect been accounted for in your analysis of AVLIS competitiveness?

Answer: Economies of scale for a U-AVLIS plant have been taken into account in terms of evaluating the competitiveness of the U-AVLIS technology. For example, a projection of the separative work unit (SWU) cost for a plant with a capacity of 3 million SWUs is less than $50 per SWU. This SWU cost is expected to decrease for larger plant capacities with a current estimate of nearly $25 per SWU for a 9 million SWU U-AVLIS plant.

QUESTIONS FROM CHAIRMAN JOHNSTON

AVLIS

Question 6: AVLIS will use a chemical process that is based on uranium oxide and metallic uranium rather than uranium oxide and uranium hexafluoride (UF6). How has as the cost of developing and commercializing this process been factored into your analysis of AVLIS competitiveness?

Answer: U-AVLIS requires chemical processing steps to supply metal feed for enrichment and to convert the enriched metal product to a form suitable for use by fuel fabricators. The cost of developing these chemical processing steps are included in the overall budget for U-AVLIS research and development.

Current cost estimates for U-AVLIS of $25 to $50 per SWU take into account costs resulting from a change from UF6 to a uranium metal economy. In fact, we currently project that significant cost savings could be realized by switching to a metal economy. By going directly from uranium ore to uranium metal for feed and going directly from metal to uranium oxide for product avoids unnecessary conversion to UF6. This reduces the number of chemical conversion steps and produces significantly less waste to be treated. Our current estimate of the savings is in the neighborhood of $10 to $15 per separative work unit.

QUESTIONS FROM CHAIRMAN JOHNSTON

AVLIS

Question 7: AVLIS technology can be used to make high enriched uranium. So it will have to be regulated fairly tightly. How has this been factored into your analysis?

Answer: Even though the U-AVLIS technology can theoretically be used to make highly enriched uranium, all proposed designs by the Department for a U-AVLIS plant provide for commercial enrichment of uranium at low assays. In fact, the proposed U-AVLIS plant facility planned by the Department is not capable of making highly enriched uranium unless significant hardware modifications are made. Therefore, U-AVLIS cost analyses have not factored in any regulatory requirements associated with the production of highly enriched uranium in a U-AVLIS plant. However, the cost analysis for U-AVLIS has considered both domestic and international requirements for low assay uranium enrichment. These include requirements by either DOE or the Nuclear Regulatory Commission to meet rules and regulations for domestic and international safeguards that are designed to assure security, material accountability and control, and operation at the low enrichment levels appropriate for commercial production.

QUESTIONS FROM CHAIRMAN JOHNSTON

AVLIS

Question 8: How much will AVLIS technology depend on a narrowing of the gap between existing capacity and world demand? Will we have to wait for more nuclear plants to be built, or existing enrichment capacity to be retired, before AVLIS can compete? When will that be?

Answer: The competitiveness of U-AVLIS technology does not depend on a narrowing of the gap between existing capacity and world demand. U-AVLIS costs are estimated to be $25 to $50 per separative work unit (SWU), which is less than the cost of all other enrichment processes. Therefore, U-AVLIS can be applied to either meet enrichment needs that are uncommitted or replace DOE's existing high cost production capacity. The time in which U-AVLIS can compete is primarily dependent on how soon it can be deployed rather than on any need for a supply and demand balance.

QUESTIONS FROM SENATOR MCCLURE

Uranium Enrichment

Question 1(a): On page 1 of your statement, you state that "we believe that it is necessary to restructure the uranium enrichment enterprise in the United States and have proposed legislation to create a Government owned enrichment corporation."

If we are to assure the future economic viability of the Federal enrichment activities, how critical is the timing of enactment of such legislation? For example, does it need to be enacted this year?

Answer: In our view, it is critical that legislation be enacted in 1990 to establish a Government corporation for uranium enrichment. Recent actions and trends in the market indicate that the enrichment enterprise must become more competitive or be in jeopardy of losing market share and not being able to provide a return on investment to the taxpayer. DOE's market share declines from 50 percent in 1995 to about 25 percent by 1999. Recently about 25 percent of DOE's market with an annual sales value of nearly $300 million has explored purchase alternatives to DOE. Nearly $3 billion in sales opportunities exist from 1996 through 1999 and price is the most important decision factor in making supplier choices.

Customers will be making purchase decisions in 1991 for post-1995 enrichment needs and the enrichment enterprise must be prepared to respond to this situation. The most effective and comprehensive solution to the market dilema facing the

Answer 1(a) (continued): enrichment enterprise is to enact legislation in 1990 creating a Government enrichment corporation with the necessary commercial flexibilities to effectively compete in the marketplace. Otherwise, the existing Government program must continue to take incremental steps to reduce costs, advance U-AVLIS technology to the point where it can be a commercial success and provide marketing initiatives that are responsive, yet still compatible with all of the constraints of a noncommercial Government program. Actions by a Government program will likely be less effective, and not as timely, potentially resulting in a declining business with little prospects for financial success.

QUESTIONS FROM SENATOR MCCLURE

Uranium Enrichment

Question 1(b): Has the Department indicated this need to the appropriate House committees? Last July the Senate again passed such legislation, yet there has been no movement.

Answer: The urgency of restructuring legislation was stressed each time this Department testified on uranium enrichment before the House during the last two sessions. The Department has also emphasized its importance in individual meetings with Representatives and their staffs. Most recently, the Department engaged Smith Barney to independently evaluate the financial and business prospects of a Government enrichment corporation. This action was taken to provide an objective, independent assessment that hopefully will be viewed as credible evidence to the appropriate House Committees that establishing a Government enrichment corporate is needed. The Smith Barney assessment was completed on May 15, 1990. The Department plans to work closely with and encourage the House to enact this legislation.

QUESTIONS FROM SENATOR MCCLURE

Uranium Enrichment

Question 1(c): Last year Secretary Watkins indicated that he considered enactment of this legislation a priority. Does the Department still support early enactment of this legislation?

Answer: Secretary Watkins considers early passage of restructuring legislation to be absolutely critical to the health and survival of the uranium enrichment enterprise.

QUESTIONS FROM SENATOR MCCLURE

Uranium Enrichment

Question 2(a): You indicated a change in policy regarding Decontamination and Decommissioning (D&D) and that beginning with fiscal year 1991 monies will be set aside from revenues for this purpose.

Does your current fee structure for civilian enrichment services incorporate a D&D component? How was this fee derived?

Answer: The FY 1991 fee structure for civilian enrichment services incorporates a D&D component. Total estimated costs of $1.4 billion for the commercial share of D&D costs will be recovered through current and future prices. As part of the Administration's legislation to create a Government enrichment corporation, the Department has proposed that beginning with fiscal year 1991, about $50 million of revenues from commercial customers be set aside annually to liquidate the commercial liability for the D&D of the enrichment facilities. In the event that Congress does not enact this legislation, the Department has proposed an alternative means to address the D&D liability in the FY 1991 budget. This alternative involves the collection of $50 million annually for deposit in a D&D fund in the U.S. Treasury. This is viewed as both a prudent and responsible means of addressing a large future environmental liability in the event that the more effective solution of enacting restructuring legislation is not taken by Congress.

QUESTIONS FROM SENATOR MCCLURE

Uranium Enrichment

Question 2(b): Does the current fee structure for military enrichment services incorporate a D&D component? Does your FY 1991 proposal anticipate such a fee component? If not, why not:

Answer: The current fee structure for military enrichment services does not incorporate a D&D component nor does DOE's FY 1991 proposal anticipate such a fee component for enrichment to the military. DOE's FY 1991 proposal anticipates that the military's share of D&D costs will be provided in annual appropriations. This is similar to the mechanism for funding the Government's share of the environmental restoration and initial D&D costs at the Oak Ridge Gaseous Diffusion Plant that is currently shut down.

QUESTIONS FROM SENATOR MCCLURE

Uranium Enrichment

Question 3(a): Recently, there have been reports that the Soviet Union intends to increase its export of enrichment services on the spot market. Their stated objective is to sell 3 to 5 million separative work units annually from excess production capacity to generate hard currency as part of their effort to revitalize their economy.

What is your judgment of the adequacy of existing Soviet stocks to support these anticipated spot market sales, or will these sales have to be produced to satisfy the anticipated spot market sales?

Answer: We do not know the full extent of Soviet stocks of enriched uranium, but we believe they are large enough to meet export targets of 3 to 5 million separative work units (SWU) annually for several years. In any event, the Soviets evidently do not need to rely on existing stocks of enriched uranium, based upon recent public statements by the Soviets that their annual excess production capacity is sufficient to support either a 3 or 5 million SWU per year export sales target.

QUESTIONS FROM SENATOR MCCLURE

Uranium Enrichment

Question 3(b): In your judgment, do the Soviets intend to sell these enrichment services below their production cost? What is our experience in this regard?

Answer: DOE monitors sales of enriched uranium to the world marketplace in order to analyze the current and future competitive situation. However, thorough analysis of the most recent market sales, including those being made by the Soviets, has not yet been completed. However, when completed, this analysis will contain information that is classified, proprietary, or commercially sensitive.

In view of these concerns, I would prefer and be pleased to provide a briefing for you in an executive session regarding the content of DOE's analysis after it has been completed.

QUESTIONS FROM SENATOR MCCLURE

Uranium Enrichment

Question 3(c): The Soviets are one of our principal competitors, why do you not have better data on the international market?

Answer: Information on the Soviet enrichment industry has not been readily available or easily obtainable. Until recently, they had never attended international meetings and conferences, published annual reports, allowed visits to their facilities, or released data on their operations. Many of the recent sales that involve Soviet enrichment have been consummated as part of third party transactions or flag swaps. As Deputy Secretary Moore and the Energy Information Administration discussed before this Committee in hearings last year, the U.S. Government has neither the authority nor the ability to track third party sales, or flag swaps, of natural uranium or uranium enrichment services. Therefore, we must rely on the industry press, our own sources in the industry and the international market place, and our own best estimates.

QUESTIONS FROM SENATOR MCCLURE

Uranium Enrichment

Question 4(a): You indicate that two of DOE's largest customers -- TVA and Commonwealth Edison -- are examining alternative enrichment sources. Others are examining the economic feasibility of terminating existing contractual commitments with DOE.

What are you doing to discourage the possibility of such contract terminations?

Answer: The Department is aggressively pursuing cost control measures at the gaseous diffusion plants including maximizing the use of inexpensive, off-peak and nonfirm power, in order to ensure that prices can be provided at competitive levels. We are also committed to completion of the U-AVLIS technology demonstration to assure that the lowest cost enrichment supply can be made available as quickly as possible. The most comprehensive and long term solution to ensure that the enrichment enterprise is competitive involves the establishment of a commercially oriented Government enrichment corporation. The Administration continues to support restructuring legislation that will accomplish this. Every effort is being made to encourage the House to take action and follow suit with the Senate in order to enact this legislation.

QUESTIONS FROM SENATOR MCCLURE

Uranium Enrichment

Question 4(b): What specific cost reduction activities have you instituted?

Answer: With regard to controlling costs, we have set an ambitious target to reduce production costs by 20 percent by the post-1995 timeframe. We have initiated a strategy to purchase up to 30 percent of our power on a nonfirm basis, i.e., on an hourly, daily, weekly, monthly, and seasonal basis. This strategy is expected to generate annual cost savings of more than $100 million. Other operational costs are being carefully evaluated to determine how production can be managed on a more cost-effective basis while still ensuring excellence in environmental, safety, and health matters.

QUESTIONS FROM SENATOR MCCLURE

Uranium Enrichment

Question 4(c): What have you done to reduce your power costs?

Answer: We have developed, and implemented, a strategy for minimizing power costs and reducing the potential liabilities associated with long-term, firm power contracts by utilizing significant amounts of lower cost, nonfirm power.

We will utilize the firm power under contract with Electric Energy, Inc. and the Ohio Valley Electric Corporation to produce about 10 million SWUs per year. Our remaining production requirement of 2 to 4 million SWUs per year will be met by purchasing honfirm power, mainly at the Paducah gaseous diffusion plant. Nonfirm power is bought on the spot market on an hourly, daily, weekly, monthly, or seasonal basis. Our experience to date in FY 1990 has been outstanding and we anticipate saving more than $100 million each year in power costs by the purchase of nonfirm power.

QUESTION FROM SENATOR MCCLURE

Uranium Enrichment

Question 5(a): Your FY91 budget seeks authority to purchase enrichment services when their prices are less than DOE's costs of production.

What would be the effect of such purchases on the costs of defense related enrichment services? Would you provide cost data for a range of purchases from zero to 30 percent in increments of 5 percent?

Answer: Cost savings resulting from the purchase of inexpensive enrichment services would eventually result in lower costs to all customers, including Government and defense customers. The actual dollar savings will depend on the differential between purchase price and what would have been the unit cost of producing the separative work (SWU) as well as the SWU amount that is purchased by the Government programs.

Answer 5(a) (continued): The following table summarizes parametrically the approximate cost impact on FY 1991 Budget Request defense related SWU of procuring inexpensive SWU in lieu of production. The data are shown as a function of the difference in purchase price and production cost and the percentage of SWU production needs that would be offset by purchase at a given cost differential. At this time, the quantity and cost of externally purchased enrichment services for FY 1991 are not yet defined.

Cost Savings for Defense Related Enrichment Services (Dollars in Millions)

Percent of Production Purchased	Purchase vs. Production Cost Differential-$/SWU		
	$5.0	$10.0	$15.0
5.0%	$0.2	$0.3	$0.5
10.0%	$0.3	$0.7	$1.0
15.0%	$0.5	$1.0	$1.6
20.0%	$0.7	$1.4	$2.1
25.0%	$0.9	$1.7	$2.6
30.0%	$1.0	$2.1	$3.1

QUESTIONS FROM SENATOR MCCLURE

Uranium Enrichment

Question 5(b): By this request, does the Administration support the purchase of Soviet enrichment services? If not, what are you suggesting?

Answer: The FY 1991 budget request contained language that would allow the Department to expend funds in FY 1991 to purchase enriched uranium from other sources. DOE is currently evaluating a range of alternatives to allow the uranium enrichment enterprise to compete effectively in a free market environment. These alternatives include the question of how best to address the import of Soviet enriched uranium. No conclusions have yet been reached. We will keep the Committee informed of any action the Department may propose to take on this matter.

Question 5(c): What restrictions now exist on the Federal governments purchase of uranium or enrichment services from the Soviets or other suppliers?

Answer: The Atomic Energy Act, as amended, gives the Department the authority to make such purchases. To fully implement a purchase agreement, however, funds would have to be appropriated by Congress. We are not aware of any restrictions on such purchases.

QUESTIONS FROM SENATOR MCCLURE

Uranium Enrichment

Question 5(d): Could the Department use brokers or third parties to effectively circumvent such restrictions?

Answer: If restrictions existed, the Department would not attempt to circumvent them.

Question 5(e): Has the Department initiated any contacts either directly or indirectly through intermediaries regarding the possible purchase of Soviet uranium or enrichment services? If so, what was the nature and extent of such discussions?

Answer: During my March 1990 visit to the Soviet Union, I raised with Soviet officials the Department of Energy's (DOE) concern over Soviet sales of heavily discounted enriched uranium. The Soviets were sensitive to this concern and indicated a willingness to explore means by which their need for hard currency through export sales and our need for a stable market could be addressed. To date, no solution has been identified.

QUESTIONS FOR RECORD FOR BOB REINSTEIN -- USTR
MAY 1, 1990

1. -- How are US trade laws used to prevent dumping and subsidization by a home country of exports to US?

   -- Which agencies are involved in analyzing dumping cases?

   -- What must be proven to win an anti-dumping case or countervailling duty case?

   -- Is there any problem in determining fair market value for products of non-market economies?

2. Is there a comparable or surrogate economy that would allow the US to examine the possible dumping of products, such as enriched uranium, from a non-market economy? For exports of enriched uranium product from the Soviet Union, what would that surrogate economy be? What specific criteria qualify it as a surrogate economy?

3. Is there a difference in the way that products and services are dealt with in US trade laws? If there is a difference, what is the significance of that distinction, especially for anti-dumping laws?

4. Suppose a US entity sent uranium, purchased for use as nuclear fuel, to the Soviet Union to be enriched, and the Soviet Union then sent it back to the U.S., would the enrichment services performed by the Soviets be classified as a product or as a service according to the US trade laws?

5. What are the top ten products exported by the Soviet Union to the United States in terms of dollar value for the most recent year for which figures are available? Please list the products and their dollar value. Where do exports of uranium enrichment services and/or enriched uranium product fit into this list?

RESPONSES TO QUESTIONS FOR THE RECORD

1. -- How are US trade laws used to prevent dumping and subsidization by a home country of exports to US?

-- Which agencies are involved in analyzing dumping cases?

-- What must be proven to win an anti-dumping case or countervailing duty case?

-- Is there any problem in determining fair market value for products of non-market economies?

Response:

Dumping of imports (i.e., sales made at less than fair value) is covered under Subtitle B of Title VII of the Tariff Act of 1930, as amended by the Trade Agreements Act of 1979 (19 U.S.C. Sect. 1673 et seq.). Petitions by a domestic industry are to be filed with the Department of Commerce (the Department), which determines whether dumping has occurred, and with the U.S. International Trade Commission (the Commission), which determines whether the imports have caused or threaten to cause material injury to the domestic industry.

Subsidized imports are covered under Subtitle A of Title VII of the Tariff Act of 1930, as amended (19 U.S.C. Sect. 1671). As with antidumping petitions, petitions by a domestic industry for imposition of a countervailing duty (CVD) against subsidized imports are to be filed with the Department of Commerce, which determines whether subsidization is occurring, and (for countries entitled to the injury test) with the U.S. International Trade Commission, which determines whether the imports have caused or threaten to cause material injury to the domestic industry.

An antidumping (countervailing) duty petition must contain evidence, pertaining to a specific country and class or kind of merchandise, that supports the allegation of dumping (subsidization) that is causing material injury (or the threat thereof) to the domestic industry.

If the Department finds that the petitioner's allegations are reasonably supported by evidence contained in the petition, an investigation is initiated. Information and data are collected from producers and exporters of the subject merchandise to determine the extent of dumping or subsidization. In some cases foreign firms refuse to provide the necessary data. The Department is then forced to rely on the best information available, which is normally data from the petition.

If the Department and the Commission make affirmative determinations with respect to dumping and injury, respectively, the Department orders U.S. Customs to impose antidumping or countervailing duties on imports of the subject merchandise from the country under investigation. The duties are designed to offset only the unfair competitive advantage that arises from dumping and subsidization -- antidumping duties do not exceed the margin of dumping and countervailing duties do not exceed the amount of subsidy benefits. In this way the U.S. antidumping and countervailing duty laws are remedial, not punitive or protectionist, in nature.

In investigations involving a nonmarket-economy country (NME), fair value cannot be determined on the basis of the foreign form's home market or third-country prices, or the firm's cost of production, as is done in the case of firms in a market-economy country. Prices in nonmarket economies are not meaningful measures of value and are, therefore, not an appropriate basis for determining fair value. The Department uses instead a "constructed value" based on the NME producer's factors of production and factor prices in a comparable market-economy (surrogate) country.

2. Is there a comparable or surrogate economy that would allow the US to examine the possible dumping of products, such as enriched uranium, from a non-market economy? For exports of enriched uranium product from the Soviet Union, what would that surrogate economy be? What specific criteria qualify it as a surrogate economy?

Response:

In the 1987 antidumping duty investigation of urea from the USSR, the Department selected the United Kingdom as the surrogate country on the basis of economic and demograph such as per capita GNP and the distribution of labor between the agricultural and non-agricultural sectors. The U.K. was also a major producer or natural gas, a major input in the production of urea.

The U.K. is not, however, the surrogate country in all dumping cases involving the USSR. The selection of a surrogate is done on a case-by-case basis and depends on the product under investigation and the availability of price information for the production factors.

3. Is there a difference in the way that products and services are dealt with in US trade laws? If there is a difference, what is the significance of that distinction, especially for anti-dumping laws?

Response:

Services are not currently covered under Title VII of the Tariff Act of 1930, as amended. Unfair trade affecting services may be responded to under Section 301 of the Trade Act of 1974, as well as under certain provisions of other laws relating to specific services.

4. Suppose a US entity sent uranium, purchased for use as a nuclear fuel, to the Soviet Union to be enriched, and the Soviet Union then sent it back to the US, would the enrichment services performed by the Soviets be classified as a product or as a service according to the US trade laws?

Response:

The enriched uranium from the Soviet Union could be considered a product of the Soviet Union for purposes of the U.S. antidumping law. However, the Department would consider the question only within the context of an investigation and only on the basis of facts and information submitted on the record of that investigation.

5. What are the top ten products exported to the United States in terms of dollar value for the most recent year for which figures are available? Please list the products and their dollar value. Where do exports of uranium enrichment services and/or enriched uranium product fit into this list?

Response:

The following are the top ten imports from the Soviet Union for 1989, by HTS number, with Customs value is thousands of dollars:

1.	27100005	Heavy fuel oils (under 25 deg.)	142,095
2.	27100010	Light fuel oils (over 25 deg.)	79,769
3.	71102900	Semiprocessed palladium	55,581
4.	28141000	Anhydrous ammonia	54,970
5.	27090010	Heavy crude oil (under 25 deg.)	54,188
6.	71103100	Unwrought rhodium	49,071
7.	71103900	Semiprocessed rhodium	35,977
8.	22089065	Vodka (valued over $2.05/liter)	24,311
9.	28442000	Enriched uranium	21,679
10.	43018000	Raw furskins	13,445

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